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A STUDY OF THE SMALL MAMMAL POPULATION ON THE FERMILAB PRAIRIE RESTORATION SITE: JUNE 19 - AUGUST 23, 1985

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November 1985

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June 24: Bright sun, 80 F; 9:30, all sign of bait had been removed or eaten over the weekend; all traps rebaited. 1-20.

21-45 site 5 in prairie: 60% of traps (15/25) had residual bait still in/on the pans; traps all reset and rebaited by 11:00.

14:42: 1-20, bright sun, 80 F; #8 LF1 tagged as young Microtus male; #18 had a dead adult male Microtus, body stiff and not in trap more than 4 hours.
21-45: no sign of activity in these traps.

June 25: Bright sun, mid 80's; 9:00; traps 1-5 all had been torn up and even crushed by some larger organism; bait gone;
#6 sprung; gate forward on 9,11 &14;
#16 young Microtus male (black belly band)(A);
#17 adult Microtus male (rt. cheek, belly and chest)
#18 young female Microtus (beard and chin blackened)
#19 juvenile Microtus male (X on belly with black marker)
(Note: adult female Microtus in #16 at 12:30 spot, no mark)

21-45, 10:00:
#24: Adult female Peromyscus (scat on bait); rosinweed(belly)
#30 Juvenile male Peromyscus " " " ; Tall Coreopsis ()
#39 Young female Peromyscus; (") beard; yellow coneflower
#40 Juvenile male Peromyscus ("); 2 bands; grass border
25 & 26 gate forward; #34 sprung; 23 scat and sprung

1-20: 14:14: 85 F; hot, sunny;
#11 juvenile male Microtus; "0" on belly; Solidago.

21 - 45: 14:40; no activity in traps.

(end day one of official tagging; 6 Microtus
4 Peromyscus

Trends To Date:

1. Microtus in area not burned; Peromyscus in prairie
2. Majority of captures after 1500 and before 9:30;
3. Food plates could be indicators of energy activities in lieu of trap
4. Where are the orthoptera and homoptera; no spiders.
5. Solidago or litter may be important to Microtus?(Little in prairie)
6. Are Microtus and Peromyscus compatible species?

June 26: 70°, clear sky, heavy dew; 1-20, 7:45.
#1 & #2 no bait, black ants present;
#5 & #6 traps sprung, scat on bait.
#11 young male Microtus in Solidago; blue belly band;
#13 adult female Microtus in Solidago; longitudinal blue;
#14 tripped, no scat
#16 scat present

9:20 check,
#7 adult male Microtus; blue beard marking; Solidago
#11 juvenile female Microtus; blue cross on ventral; Solidago

(4 new individual captures in total)

Traps 21-45 in Prairie #5; 9:20
#25 juvenile male Peromyscus; blue horizontal stripe
#26 gate forward, bait gone
#29 juvenile male Peromyscus ; two blue horizontals
#38 adult female Peromyscus (pregnant); tall Coreopsis trip.

(3 new individual captures, all Peromyscus)

1-20; 1530, 90°, hot and humid; no signs of trap activity.

21-45; 1547, no sign of activity

June 27: 65° at 7:45, no captures since 9:30 on June 26; traps 1 - 20; 1st day for Lincoln Index recapture data:

#5 bait gone, gate forward;
#6 & #9 tripped with feces present;
#10 juvenile male Microtus ; blue balls on flanks;
#11 juvenile male Microtus; tumor left front shoulder;
#12 & #14; bait gone, rebaited
#15,16,18,19 & 20 all needed new bait.

(2 new individual captures; both Microtus)

Traps 21 - 45; 8:22
#23, 26, 28, 29, all sprung; bait intact on 26 & 28.
#32 juvenile male Peromyscus; blue "inverted Y"; Andropogon
#39 young female Peromyscus; diagonal stripe; Ratibida pinna

(2 new individual captures, both Peromyscus)

1 - 20; 1615, 80, hazy sun

#3 rebaited; #14 sprung
#15 adult female Microtus, two "V" on ventral; Solidago

(1 new capture, Microtus)

21 - 45; 1655, hazy, no captures; storm front moving in; temperature dropping and windy; observed green, slender katydid near trap #21

rechecked traps at 1900, no signs of activity

June 28, 1985: rain overnight, 60's and overcast; second day for recording Lincoln index data. Traps 1 - 20: Many traps showed bait missing or doors sprung; either due to pressure from precipitatipn or increased mammal activity after rainstorm. 9:15
#2,3,5 & 6 sprung and bait missing.
#8 adult female Microtus; new, longitudinal blue line.
#9 sprung
#10, scat on food, not sprung
#11 young male Microtus, recapture..some blue, Solidago
#12 sprung, scat
#13 adult male Microtus, "bluebeard, recapture".faded)
#14 & 15 sprung
#18 juvenile female Microtus, bluecross recapture

(3 recaptures, 1 new..all Microtus)

Traps 21 - 45:

10:00 as with 1-20, many traps sprung or lacking bait
#22,26,27 +- all sprung
#28 adult female Peromyscus, "Z" recapture; (Heliopsis
#37 juvenile male Peromyscus, new; sore on inner left thigh (Heliopsis)
#38 gate forward
#40 adult male Peromyscus, new side stripes; Solidago

(2 new, 1 recapture..all Peromyscus)

1332: final check for Lincoln index; clear, 80!s
Traps 1 - 20:
#19 juvenile male Microtus, tumor right front; recapt Solidago ; marking ink worn off

(1 recapture, Microtus)

Population Estimates for Solidago/Brom woods and for Prairie #5:

1. Lincoln/Peterson Index Technique:

$$\frac{\text{Original \# Individuals} \times \text{Total \# In 2nd Sample}}{\text{\# of Recaptures In 2nd Sample}}$$

A. Solidago/Woods: $\frac{10 \times 8}{4} = 20$ Microtus per 1/4 acre; 80/acre

B. Prairie #5: $\frac{7 \times 5}{1} = 35$ Peromyscus per 1/4 acre; 140/acre

2. Actual individual trappings: 4 trap days

A. Solidago/Woods: (all Microtus)
3 young, 4 juveniles, 1 adult : males= 8
1 young, 1 juvenile , 4 adult: female= 6
14 per 1/4

B. Prairie #5: (all Peromyscus)
0 young, 6 juveniles, 1 adult : males = 7
2 young, 0 juveniles, 2 adult: females = 4
11 per 1/4

General Concluding Observations:

1. The two species, Microtus pennsylvanicus and Peromyscus maniculatus do not share the two sampled habitats.
2. Population of Microtus may be from 14 - 20 per 1/4 acre. in the Solidago/Woods area.
3. Population of Peromyscus may be from 11 - 35 per 1/4 acre.
4. Activity of both trapped species appeared highest in the period following rainfall activity; least during high temperatu and humidity.
5. Permanent marking pens, laundry pens and El Marko do not make lasting tags in the field, at best there is some residual coloration after 48 hours; this is not a good technique.
6. There may be a connection between the Solidago and the Microtus; or the presence of ground litter and Microtus.
7. In the two areas sampled, Microtus appears to be active day or night while the Peromyscus appear to be more active in the evening, night.
8. Both the Peromyscus and the Microtus appear to be breeding populations, as individuals of all ages were captured.

6/19/85 – 6/28/85

TOTAL TRAP CAPTURES

PRAIRIE #5

MAINLY GRASS – { ANDROPOGON GERARDII / SORGHASTRUM NUTANS

YOUNG MIXED FORBS.

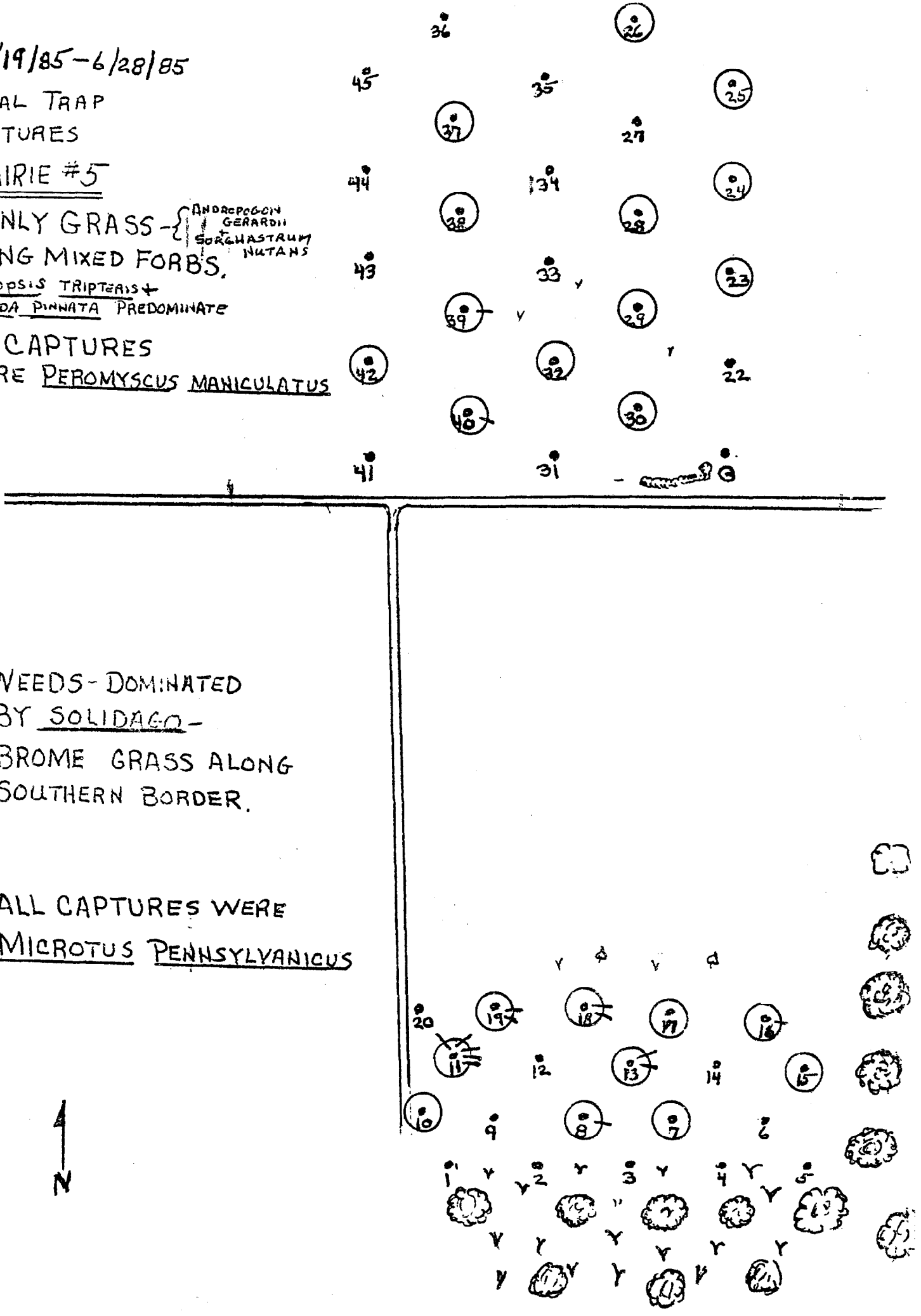
COREOPSIS TRIPTERIS + RATIBIDA PINNATA PREDOMINATE

ALL CAPTURES WERE PEROMYSCUS MANICULATUS

WEEDS - DOMINATED BY SOLIDAGO -

BROME GRASS ALONG SOUTHERN BORDER.

ALL CAPTURES WERE MICROTUS PENNSYLVANICUS



Prairie Site #1 & Prairie Site #2:

Week of July 1 - July 5, 1985

Traps left with bait in them and placed into the new prairie sites on Friday afternoon, June 28, 1985. Traps 1 - 25 were placed in Prairie Site #1 and traps 31 - 55 were placed in Prairie Site #2. A staggered grid pattern was established, with 21 feet between traps. Each site covered approximately 1/4 acre.

Prairie Site #1 is an older restored site, being planted in 1975 and burned each year. There is little litter on the prairie floor some row effect is noticeable due to the planting method used. There is a wider variety of species than seen in the Site 5 previously trapped. More numerous and more mature Silphiums are obvious as are other forbs. Site 1 appears to be moister in the eastern, longer vegetation area and dried toward the western portion. Of the 25 traps with residual bait placed in the field on 6/28/85, 17 of them still showed bait on July 1. The traps were freshly baited and set on July 1 .

Prairie Site #2 was planted in 1976 and is a year younger than Site #1. The rowing effect is quite noticeable, more Solidago is present than in Site 1. Less dense vegetation than Site #1. Andropogon is the dominant vegetative feature spotted with Coreopsis and younger (smaller) Silphiums. The traps with residual bait still on them after being left open for the weekend numbered 8 out of 25.

July 1: Prairie #1, traps 1 - 25, traps freshly baited 9:00
Prairie #2, traps 31 - 55, freshly baited at 10:00.
Sky clear, temperature 80°.

Prairie #1, no trap disturbances at 1400; pheasant wallow noted at trap site #23, soil dry.

Prairie #2, adult female Microtus pennsylvanicus, toe-coded as Left Front #1 (LF1) (numbered from the inside out and not counting the thumb.) in trap #45 at 1430, sunny, 80°. Andropogon and Ratibida pinnata closest to trap.

(1 capture, Microtus)

Prairie Sites #1 & #2:

July 2, 1985: Prairie #1, traps 1 - 25, 80°, sumny, rain predicted.
#3 tripped, No sign of activity (NA).
#6 NA
No signs of scat or other activity at 9:30.

Prairie #2, traps 31 - 55, 9:53, light rain falling,
#43 & 46 sprung, NA
(many small white moths present after the rain)

No sign of activity after the first day of capturing.
a few coleoptera, lepidoptera and hymenoptera; no
ants or others on the food; no orthoptera or homoptera.

Prairie #1, 1430 overcast, 70's, following heavy
shower at 10 -1100, looks like more showers approaching.
NA in any of the traps.

Prairie #2, 1500. No activity.

July 3, 1985: Prairie #1, traps 1 - 25, hot, humid, 80's,
following evening storm. 9:30 , prairie very wet.
#10 sprung, NA, bait very soggy.
No signs of activity.

Prairie #2, bait replaced in traps 31 - 55;
#39adult female Microtus , recapture, LF1
no other activity; monarch butterfly, mourning cloak,
3 grasshoppers noted.

Prairie #1, bright sun, 80's. Prairie dried out, 1417.
Bait replaced on traps 1 - 25, no activity.
[illegible]; paper wasp "nest"
noted on prairie dock at trap #10.

Prairie #2, 1500, bright sun, prairie dried out.
no activity, yellowthroats and redwings active; dying
compass plant at trap site #35.

July 4, 1985: Prairie #1, 11:25, 70's, overcast.
#6 adult male Peromyscus maniculatus , new Right Rear 5
(RR5, counting from inside-out) Andropogon.
#13 scat

(1 capture, Peromyscus maniculatus) (RR5) new

Prairie #2, 12:00, scat activity at #33,35,42
#41 adult female Microtus, LF1 (recapture) Andropogon
#46 adult male Microtus , LF2 (new) Andropogon

(2captures, both Microtus, one recap and one new)

Prairie Site #1 & Prairie Site #2:

July 5, 1985: Prairie #1, 900, 80 and sunny, following storm at 2300.
#3 adult male Microtus, new , LR2 Desmodium, Silphium (dc
#4 &5 sprung
#10 adult female Microtus (unmarked), dead in trap (?)
#12 scat, sprung
#14 & 15 torn out of ground
#16 adult female Microtus, new LF3, Desmodium, Silphium, (dock)
#17 sprung, scat

(3 captures, all new Microtus)

Prairie #2, 946, sunny, prairie wet.
#34, gate forward
#35 adult female Peromyscus, RR5, new, Solidago/Andropogc
#38 bait gone
#39 gate forward, baited
#43 gate forward, baited
#45 tripped, scat
#46, 48, 49 bait gone, tripped
#50 tripped, scat
#51 tripped, NA
#55 bait gone
(observation, most trap activity appears to follow the night time trappings after a rain storm)

(1 capture, new Peromyscus RR5)

Prairie #1, 1217, sun, windy 80's, traps checked and moved to new prairie site 4
No activity, traps left with bait and placed in #4 site

Prairie #2, 1300,
#39 adult male Microtus, new LR3 Andropogon

(1 capture, new Microtus, LR3)
traps moved to prairie site #3

Population Estimates For Prairie Sites # 1 & #2:

Prairie Site #1: Lincoln Index, $\frac{0 \times 3}{0}$ Microtus "0"

Actual Sightings: 1 adult male Microtus = 1
2 adult female Microtus = 2
3
1 adult male Peromyscus

Prairie Site #2: Lincoln Index, $\frac{1 \times 3}{1}$ = 3 / ¼ acre Microtus

Actual Sightings: 2 adult male Microtus = 2
1 adult female Microtus = 1
3
1 adult female Peromyscus

Conclusions For Prairies #1 & #2:

1. Populations appear very sparse in both tested sites of prairies # 1 & # 2.

2. The Microtus population as actually observed from the trappings would be at a minimum of 3 per 1/4 acre or 12/acre in prairie #1 and #2.

3. There was a single capture of Peromyscus maniculatus in each of the two prairies for an estimated population of 1 per 1/4 acre or 4 per acre. This number was too sparse to use in the Lincoln/Peterson Index System.

4. Best results appear to be after a storm, usually showing evening activity of the beasts.

5. The two species, Microtus and Peromyscus, do not seem to mix to a high degree within the tested areas.

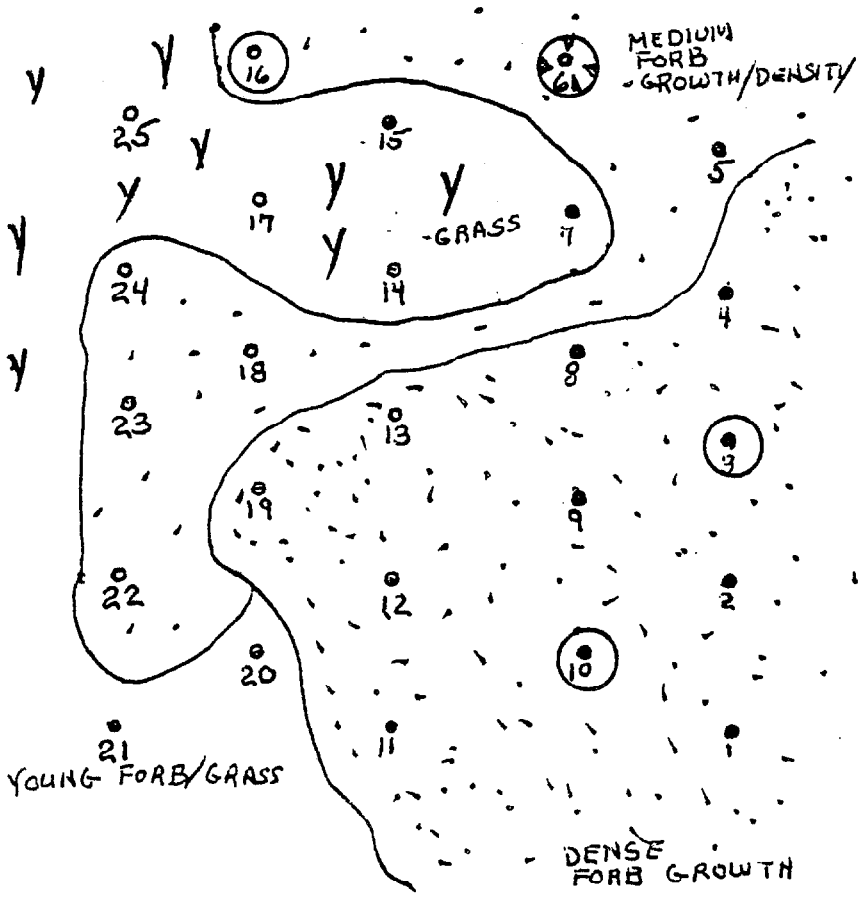
6. The disappearance of the bait from the unset traps during the initial acclimatazation may be a potential method of indicating relative activity within the test sites.

7. All of the captured beasts in both Prairies #1 & #2 were sexually mature, adult specimens. There was no evidence of young or juvenile specimens.

8. One female Microtus was captured 3 times, traps 39,41 and 45; indicating a movement of at least 104 feet during the 4 day trap period. This may also indicate that she is making her home within the immediate area and is not a nomadic wanderer.

PRAIRIE #1
7/1 - 7/5/85

TOTAL TRAP CAPTURES

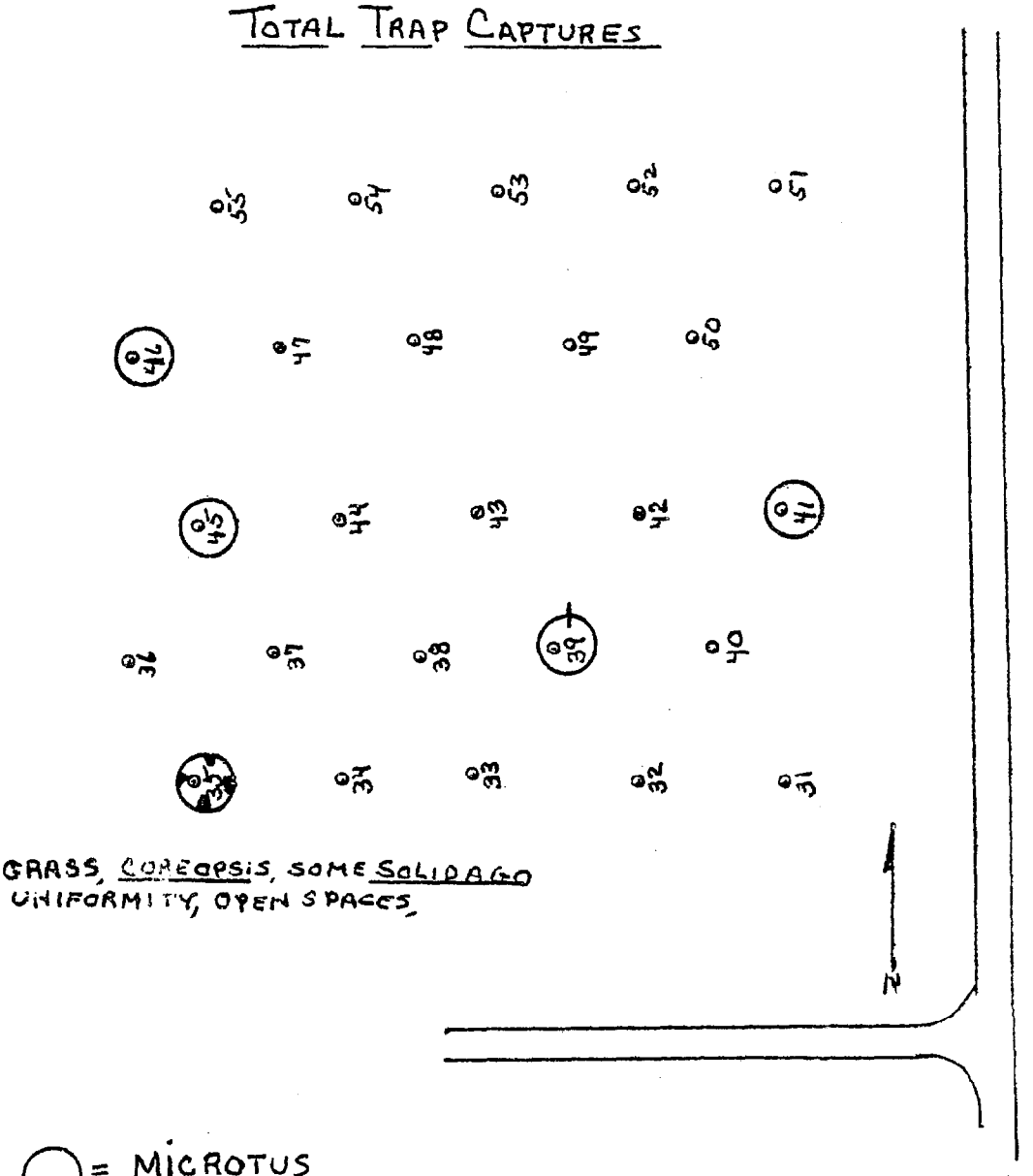


○ = MICROTUS

⊗ = PEROMYSCUS

PRAIRIE #2
7/1 - 7/5/85

TOTAL TRAP CAPTURES



GRASS, COREOPSIS, SOME SOLIDAGO
UNIFORMITY, OPEN SPACES

○ = MICROTUS

◔ = PEROMYSCUS

Prairie Site #3
7/8-7/12/85

Basically an Andropogon dominant area; plants appear in easily traversed rows, some litter on floor. Rear portion has thick growth of Reed Canary Grass, appears this area did not burn last year as the litter on the prairie floor is very dense. Grasshoppers, dragonfly species and a mayfly were noted. More insect activity on this site than on previous two (#1 &#2) may be due to the nabitat or the later date, temperatures, etc.?

Traps baited and set in the field at 10:20; number of traps which had all of the residual bait removed over the weekend was 13/25. Traps 31 - 55 placed in this field.

7/8: 14:00; hazy, some wind, 80's
#49: adult female Microtus pennsylvanicus; Reed canary grass, toe-coded as RR4
#55: adult male Microtus; Reed canary grass; RR3

(2 captures, Microtus; RR3 & RR4)

7/9: 10:00; hot, bright sun, humid
bait gone from 34,39, 41, 45
#46: adult male Microtus, Reed canary grass; RR5
#54: cleaned
#55: adult female Microtus; Reed canary grass; LR4

(2 Microtus captures; RR5 & LR4)

14:19; hot, storm approaching
#39: adult female Microtus, recapture, RR4, rosin weed
#55: adult male Microtus, unmarked, dead in trap, reed canary

(2 Microtus, one dead and one recapture, RR4)

7/10: 9:48 following big storm at 2100, prairie very wet, 75, sunny
Following traps sprung, but show no signs of fecal or bait removal, probably sprung from storm activity:
33, 35, 36, 40, 41, 46, 48, 49, 50, 51, 53, 54, 55
Fresh bait added to: 39, 40, 41, 42, 46, 49, 51, 55
#38 young male Microtus, RF1 , Andropogon
#45 adult male Microtus, dead in trap; slugs on open wounds this was a recapture, RR5; caught in gate????
Traps 39, 42, 43 torn out of ground by something.

(2 Microtus, one new, RF1 & one recapture (DOA) RR5)

14:35 80, sunny and warm
new bait placed in 33, 34, 38, 39, 42, 45, 51, 52, 53, 55
traps without bottom bait pans appear to lose bait from heat or insects or ????
#31 adult female Microtus, RF4 Andropogon/Silphium (dock)
#49 young male Microtus, recapture, Andropogon , RF1

(2 Microtus, one new, RF4 and a recapture, RF1)

Prairie #3 (cont)

7/11: 9:46, grass wet, overcast in 70's;
new bait placed in: 31, 34, 41, 42, 45, 46,51, 52, 54, 55
33 sprung with drops of feces, box elder bug in 45,
gate on 54 pulled forward;
#36 juvenile female Microtus, RR2, Andropogon
#39 adult female Microtus, RF4, recapture, Andropogon
#49 young male Microtus, RF1, recapture, Andropogon
#53 adult male Microtus, RR5 (new..replacement number)
Andropogon/Phlaris edge
(Ground litter obvious in all above captures)

(4 captures, all Microtus, 2 new RR2 & RR5; 2 recaps, RF4 & RF1)

14:27; hot, partly cloudy, 80's
new bait, no activity on: 37, 42, 46, 47, 52, 53

#50 adult female Microtus, RF4, recapture, Solidago/Andropog
#54 adult female Sorex cinereus (masked shrew), dead in trap
appears to have been nursing; Phlaris
#55 adult female Microtus, new, dead in trap(?); pregnent

(3 captures, 1 Microtus recapture, RF4, one new, dead;
1 masked shrew, Sorex cinereus, dead)

7/12: 9:43, light dew, overcast in 70's
#33 sprung
#34 no bait, rebaited
#35 gate forward, Microtus scat
#36 male Sorex, masked shrew, older juvenile; dead in trap.
Andropogon at edge of Phlaris, dense litter on ground.
#44, 45, 46 47 bait missing, rebaited; no activity obvious.
#48 adult female Microtus, RF4, recapture (trap-happy?)
Phlaris/Sorghastrum, much litter obvious; grass pulled int
can, beast urinated freely upon handling.
#49 juvenile male Microtus, recapture, RF1, Sorgastrum/Andropo
much litter on ground
#50 adult female Microtus , new, brown phase coat, Solidago, F
adult field crickets seen by trap, male & female.
#51 rebaited, NA
#52 adult male Microtus, LF1, new; Andropogon, urinated freely
#53,54,55..gate forward, rebaited

(Adult bumblebee see on Eryngium yuccifolium)

(5 captures, 1 male Sorex, dead; 4 Microtus, 2 recaptures RF4 & RF1; 2 new RR5 (replacement) & LF1)

15:13, 80's, hazy with slight breeze. Traps checked and moved
#50 adult female Microtus, RF4, recapture, Sorghastrum, litter
#52 adult female Microtus, RR5, recapture, Sorghastrum, litter
#54 juvenile male Microtus, RF1, recapture; Phlaris, much litt

(3 captures, all Microtus, all recaptures: FR4, RR5, RF1)

Prairie Site #3 (cont)

Populations: Using the Lincoln Index method, the following calculations would determine a population of 16.3 Microtus/ ¼ acre

Microtus: $\frac{7 \text{ originals} \quad X \ 7 \text{ in second trap period}}{3 \text{ recaptures}} = 49/3, \ 16.33 \ /¼a$

In using an actual individual trapping over a 4 day period, the Minimal populations based on actual trappings were:

Microtus: 4 A male, 5 A fem; 0 J male, 1 J fem; 1 Y male, 0 Y fe
or a total of 11 per ¼ acre

Peromyscus captures= none

Sorex cinereus (masked shrew) 1 A female, 1 old J male = 2/¼a

Total small mammal population actually sampled was 13 animals / ¼ acre

General observations:

1. Six of the 25 traps were located in an area which was rich in plant debris (litter) from previous year(s). These traps, and their bordering ones were very active in capturing these small mammals, Phlaris arundinacea was dominant in this portion.

2. The species of plant doesn't appear to be too important as to the mammalian captures.

3. The reasons for the exclusions of the Peromyscus in this field is not understood at this time.

4. The two masked shrews, Sorex, were found dead in the traps, reason unknown.

5. This field was very easy to walk through and the rowing effect of the original plantings was obvious, litter was present throughout.

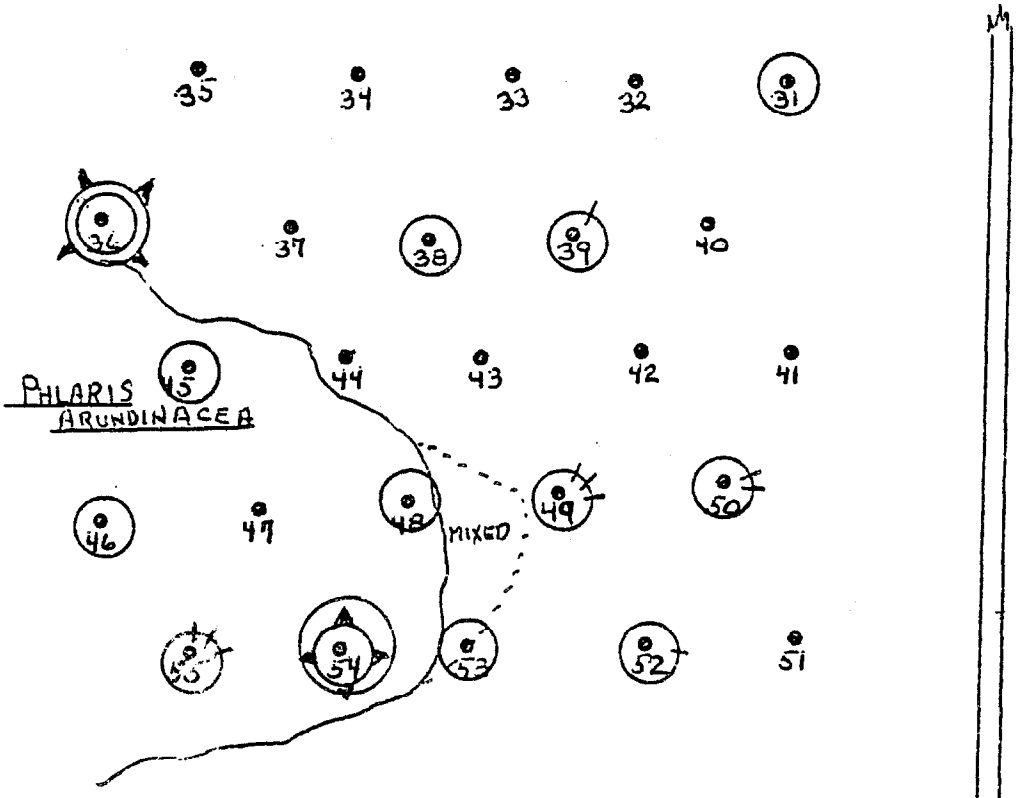
6. Several of the animals became acclimated to the traps and even appeared to wait for their next meal in the traps; two individuals were trapped 4 and 5 times.

7. The number of recaptures in this field leads one to believe that the toe-coding mutilation method of tagging does not deter the activity of the individuals.

8. The presence of a single juvenile and a single young Microtus gives evidence towards the fact that a breeding Microtus population inhabits this prairie ecosystem.

PRAIRIE #3
7/8-7/12/85

TOTAL TRAP CAPTURES



"ROWED" PRAIRIE GRASSES; MIXED FORBS, SOME EURASIANS; SOME LITTER THROUGHOUT, MUCH LITTER IN PHLARIS AREA

= MICROTUS PENNSYLVANICUS CAPTURE

= PEROMYSCUS MANICULATUS CAPTURE

= SOREX CINEREUS CAPTURE

= 2ND CAPTURE IN SAME TRAP

Prairie Site #4
7/8 - 7/12/85

Very patchy area, traps 1 - 15 generally being in a forb dominated area with brome and quack grass; tall coreopsis and yellow cone flowe: are dominant forbs. In the other area, traps 16-25, there are "islands" of prairie grasses, wide variety of species, many open spaces to the prairie floor.

Traps 1 - 25 placed in the field in the staggered grid pattern with 21 feet allowed between traps and rows. 8 of the 25 traps had residual bait removed from them over the weekend, traps set and rebaited at 9:17, hot, sunny, 80's.

7/8: 13:21, many young grasshoppers noted;
#18; adult male Microtus, Andropogon, LR5 (much blood loss)
(litter of 3 Peromyscus located along roadside)
(1 capture, Microtus, LR5)

7/9: 9:18; 80's, hot and humid
#1 & 5: rebaited
#2 ants
#9 juvenile (Adult) female Peromyscus maniculatus, RR2, raspberries
#18 young female Peromyscus, no tail
#23, gate forward, rebaited
#24 TWO adult male Microtus in same trap (a first!)
RF2 & RR2, Solidago & Andropogon

(4 captures, 2 Peromyscus, RR2 & no tail;
2 Microtus, RF2 & RR2)

14:00 : no activity noted

7/10: 9:16, following heavy rains of 2100 previous night;
prairie still very wet.
Following traps sprung, possibly from storm activity:
1, 3, 5, 9, 10, 13, 14, 18, 21, 23, 25.
(Springing of these traps by storm may preclude animal captures.
New bait added to: 13, 21, 25
No captures; milkweed beetles seen mating on milkweed plant

14:11 No activity, 80, humid and sunny.
Nest of three baby Peromyscus noted at road's edge on 7/8, now deserted; baby mice moved or ???

7/11: Overcast, cloudy 70's following overnight lows in 60's. 9:09
Following traps were sprung, 1(scat), 9 (scat), 13, 18 (rebait), 23 rebait, 24 rebait
#12 juvenile female Peromyscus LR5, bromegrass
#19 adult male Peromyscus LR4, brome/tall Coreopsis

(2 captures, both new Peromyscus, LR5 & LR4)

14:22 hot, 80's
#22 sprung with scat, rebaited. Green lacewing and leafhoppe: noted; no captures

Prairie #4 (cont).

7/12: 9:00, humid, overcast, light dew in prairie
Many sprung traps, 1,5,7,8,9,15,17, 25;
New bait in 5 (Peromyscus scat); 9, 17, 25 (Microtus scat)
#13 adult female Peromyscus, RR2, recapture, nursing, Solidago
#18 young female Microtus, RR2 (new); Andropogon/Coreopsis t
#19 adult female Peromyscus, LR5, (new); Bromus/Solidago
#22 adult male Microtus, LR5, recapture, Coreopsis tripteris

(4 captures, 2 Peromyscus, 1 recap RR2 & 1 new, LR5;
2 Microtus, 1 recapture, LR5 & 1 new, RR2)

13:35, humid, overcast, 80's; traps collected and moved to prairie plot #6.
#8 adult male Microtus, new, RR Solidago.
#20 adult female Microtus, new, 2LR2; Solidago

(2 captures, both new Microtus, RR3 & RR2LR2)

Population Estimates For Prairie Plot # 4:

Using the Lincoln Index, capture/recapture formula:

A. Microtus pennsylvanicus: $\frac{3 \text{ orig} \times 4 \text{ new total}}{1 \text{ recapture}} = 12$ / ¼ acre

B. Peromyscus maniculatus: $\frac{2 \text{ original} \times 4 \text{ new total}}{1 \text{ recapture}} = 8$ /¼ ac

(note: the results of 7/10 were the day following a heavy evening/night storm, field saturated; results affected by wet field conditions???)

Actual Population Minimums Based On Captures:

A. Microtus: 4 A males 1 A fem; 0 Juveniles; 0 Y males 1 Y fem = 6

B. Peromyscus: 1 A male 2 A fem; 1 J female; 0 Y males, 1 Y fem= 5

Total Small Mammal Population Is A Minimum of 11 Individuals / ¼ ac

General Observations:

1. Prairie was patchy, easy to walk through, much tall Coreopsis, island of Andropogon and Sorghastrum; much short grass present.

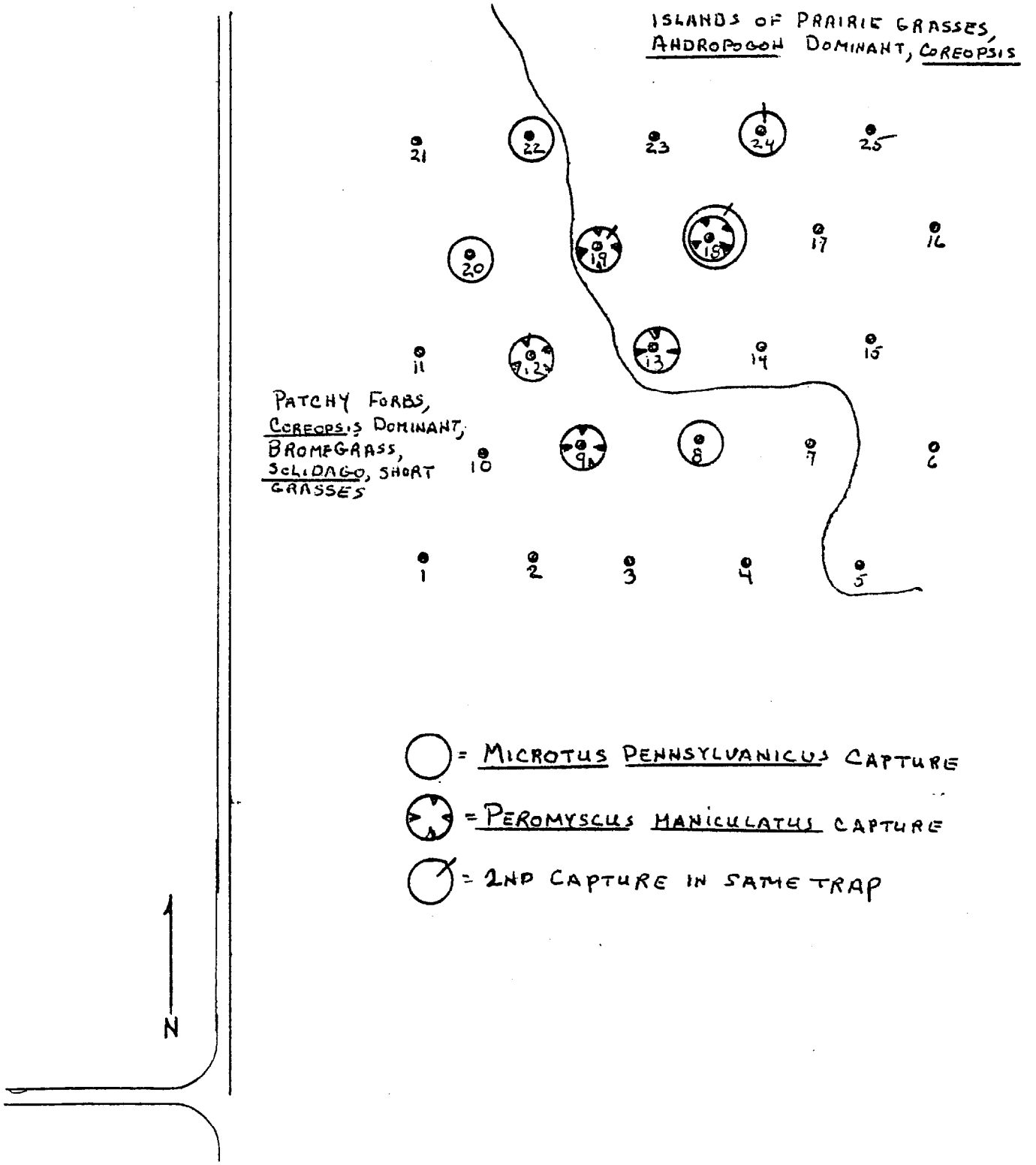
2. Many more adylt male Microtus than females; fewer recaptures than in plot #3;

3. Peromyscus population in center of site, adult, juvenile and youn present; Peromyscus not as widely scattered as the Microtus.

4. Storms appear to halt capture activity for 24-36 hours afterwards

PRAIRIE #4
7/8-7/12/85

TOTAL TRAP CAPTURES



Prairie Site #6
7/15-7/19/85

Mainly a Sorghastrum prairie with areas of Solidago being very evident; spotty prairie forbs and Kentucky blue grass are evident, area is relatively easy to walk through, little if any litter is present on the floor of this prairie.

7/15: 9:32, 70's, prairie very damp, storm passed through area at 2100 the previous evening. Traps freshly baited and set. 2 of 25 traps had residual bait removed over the weekend.
1400: breezy, 80's; no activity .

7/16: 9:30, 80, sunny and dry;
#3 sprung, NA
#4 adult, male Microtus pennsylvanicus, RR2, Solidago
#10 adult, male MicrotusRR3, Solidago (very aggressive)
#13 adult, female Peromyscus maniculatus, LR5, nursing, this one did not cower in the can, ate all bait, Solidago
#14 sprung, no activity

(3 captures, 2 Microtus:RR2 adult male & RR3 adult male;
1 Peromyscus, LR5, adult female)

1410: 80, sunny slight breeze;
#3 adult female Microtus, RR4, Andropogon/Solidago

(1 capture, adult female Microtus, RR4)

7/17: 9:15, 70's, sunny; temperature in 50's overnight;
#1 juvenile male Microtus, unmarked; escaped; Solidago
#6 adult female Microtus, RR5, Solidago
#14 adult female Peromyscus, LF5, Andropogon, bait gone
#22,23 &25 were upset, bait intact

(3 captures, 1 adult female Microtus, RR5; 1 juv. Microtus,
1 adult female Peromyscus, LF5)

1416: 80's, bright sun, dry.
#3 RF4, adult male Microtus, Solidago/Poa
#6 Dead In Trap, adult female Microtus, Solidago

(2 captures, both Microtus, RF4, adult male and a female adult, DIT; both new captures)

Prairie #6, cont.

7/18: 9:30, 70, dry, sunny.
#5 sprung, NA
#9 adult female Microtus, new RR4
#12 & 23 cleaned of bait; new bait added.

(1 capture, Microtus, adult female, RR4)

1433: 80, hot, bright sunlight
#5 juvenile female Microtus, RF2; Solidago/Timothey.
#9 adult female Microtus, RR4, dead in trap; recapture Solidago

(2 captures, both Microtus; juvenile female, RF2 & recaptured adult female, RR4, dead in trap)

7/19: 9:26, 70, overcast, high humidity
#5 adult male Microtus, RR4, recapture Solidago.
#12 cleaned of bait; rebaited
#17 adult female Peromyscus, LF5, recapture, Sorghastrum

(2 captures, 1 adult male Microtus, RR4, recapture
1 adult female Peromyscus, LF5, recapture)

1213: overcast, cloudy, 70's with high humidity.
#12 adult female Microtus, new RF3, Solidago.

(1 capture, adult female Microtus, RF3 (new)).

(Traps collected and moved to prairie site #8)

Populations: Using the Lincoln Index method, the calculations would determine a population of 21 Microtus/ ¼ acre

Microtus: $\frac{7 \text{ originals} \quad X \quad 6 \text{ in second trap period}}{2 \text{ recaptures}} = 42/2, \underline{21 / \frac{1}{4}A}$

In using an actual count of the individuals caught over a 4 day period, the Minimal populations would be:

Microtus: 4 A male, 4 A fem; 1 juv male, 2 juv fem; = 11/¼A

Peromyscus: 2 adult females or a total of = 2/¼A

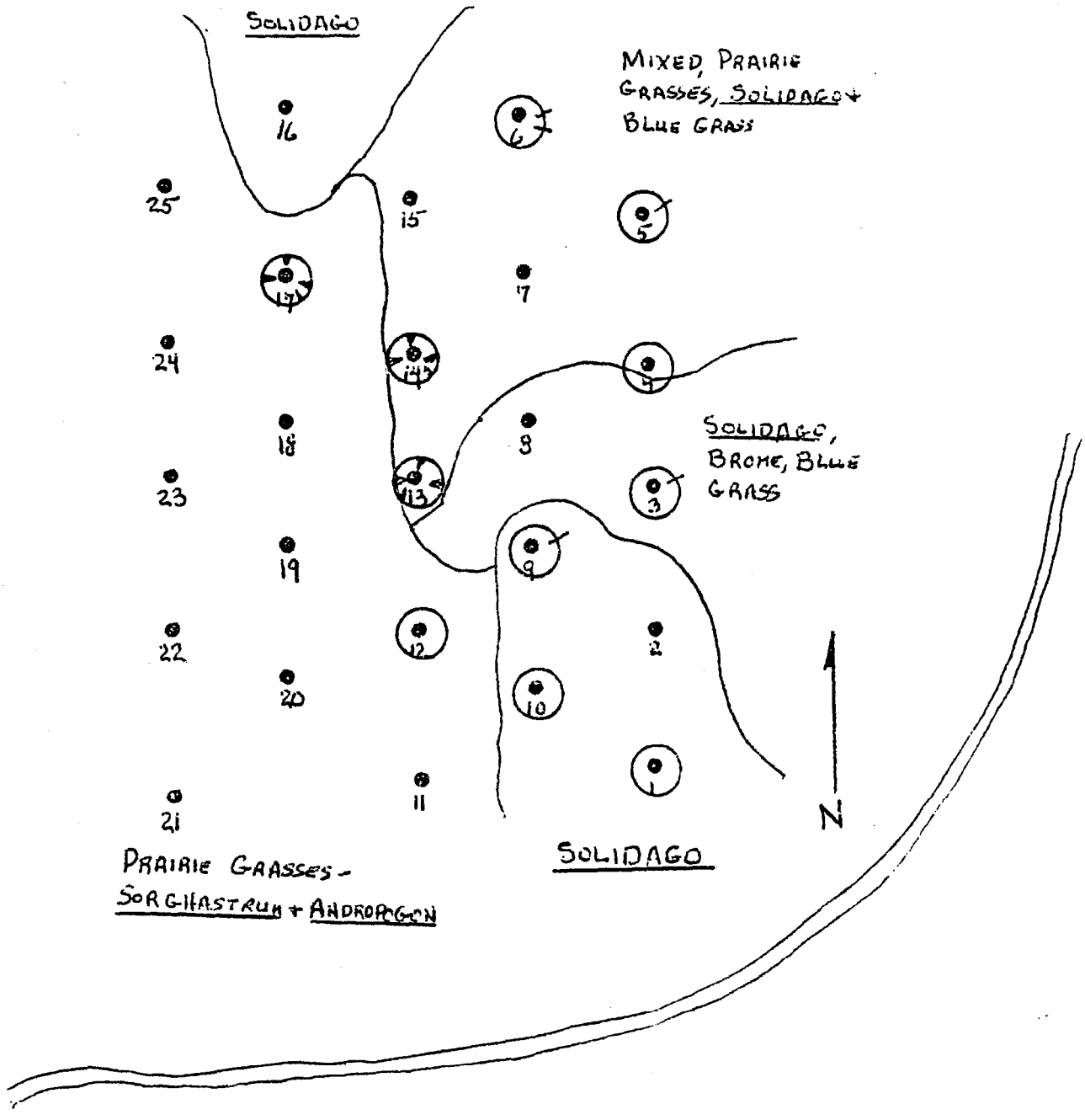
Total small mammal population actually sampled was 13 animals/¼ Acre

General Observations:

1. Six 8 inch opening "Havahart" traps were used in conjunction with the Fitch traps which have a 2" x 2" opening. It appears the population results of field studies will vary according to the type, size, of trap used in the study.
2. 14 of the 16 captures were in the Solidago rich areas, only 2 captures were in the prairie-rich grass area.
3. The Peromyscus are very localized within the field; female nursing.
4. Juvenile Microtus indicates a breeding population.

PRAIRIE #6
7/15- 7/19/85

TOTAL TRAP CAPTURES



= MICROTUS CAPTURE

= SECOND CAPTURE IN TRAP

= PEROMYSCUS CAPTURE

Prairie Site #7
7/15 - 7/19/85

This prairie is very patchy and easy to walk through. There are many areas of Solidago and Bromus intermixed with the prairie grasses; many ~~typical~~ prairie forbs are interspersed throughout this site. It has the closest proximity to the ring road of any sites sampled.

7/15: 10:31, traps set and fresh bait added. 8/25 traps or 32% had the bait removed during the weekend. Blarina scat evident in trap #51.

1438: 80, bright and sunny
#38 Citellus (Spermophilus) tridecemlineatus , juvenile male impaled on trap tongue; dead. Solidago.
(1 capture, juvenile male Spermophilus, dead)

7/16: 10:16, 80's, dry and sunny
#35 adult female Microtus, RR3, Solidago
#37 adult male Blarina brevicaudata, dead in trap, Andropogon
#49 adult female Peromyscus LF1 Andropogon/Melilotus
#52 adult female Blarina, dead in trap, Andropogon/Melilotus

(4 captures, 1 Microtus, adult female RR3
2 Blarina, male & female, 1 adult female Peromyscus, LF1

1438: No Activity

7/17: 10:00, 70's, sunny and dry.
Bait gone from 35,39,41, 43, 46 &47..these traps do not have a bottom bait tray, and insects may be removing bait as the traps have not been triggered.
#31 adult female Peromyscus maniculatus, Solidago/Andropogon
#51 bait gone, darkling beetles in trap (2)

(1capture , Peromyscus adule female, LR2)

1446: 80, dry, bright sun
#47 LF5 juvenile female Spermophilus, Andropogon
#49 adult male Microtus, chest tumor, Andropogon/Melilotus

(2 captures, 1 Microtus with chest tumor, adult male;
1 Spermophilus, juvenile female, LF5)

7/18: 10:08: 70's, bright sun, breezy, dry.
#34 adult female Microtus, RR4, new, Solidago
#39, 40, 46, 47, all cleaned, no bait pan; not tripped
#49 juvenile female Microtus, LR3, Andropogon.
#55 rebaited, no activity

(2 captures, adult female Microtus, RR4 & juvenile female Microtus, LR3)

1455: 80's, hot, bright sunny day
No signs of activity.

Prairie Site 7 (cont)

7/19: 70, overcast, high humidity; 9:54.
#31 adult female Microtus, RR4, recapture, Solidago/Phlaris
#39 juvenile female Peromyscus, RR5, Solidago/Phlaris
#43 rebait, no activity
#46 adult female Peromyscus, RR2, Phlaris

(3 captures, 1 adult female Microtus, RR4 recapture;
2 Peromyscus, juvenile female, RR5 & adult female, RR2)

1400: cloudy, 70's overcast;
No activity; traps moved to control site outside ring.

Populations: The number of individuals of each species captured was too small to use the Lincoln Index formula of population.

Actual count of individuals trapped in this 1/4 acre plot:

Microtus:	1 adult male, 3 adult females, 1 juv female	= 5/¼acre
Peromyscus:	1 adult male, 2 adult females, 1 juv female	= 4/¼acre
Blarina:	1 adult male, 1 adult female	= 2/¼acre
Spermophilus:	1 juv male, 1 juve female	= 2/¼acre

The total small mammal captures for this prairie site was 13/¼ acre

Observations:

1. This site showed the most species variety yet encountered, 4.

2. The Microtus numbers and activity times may be affected by the predatory action of the Spermophilus (Citellus).

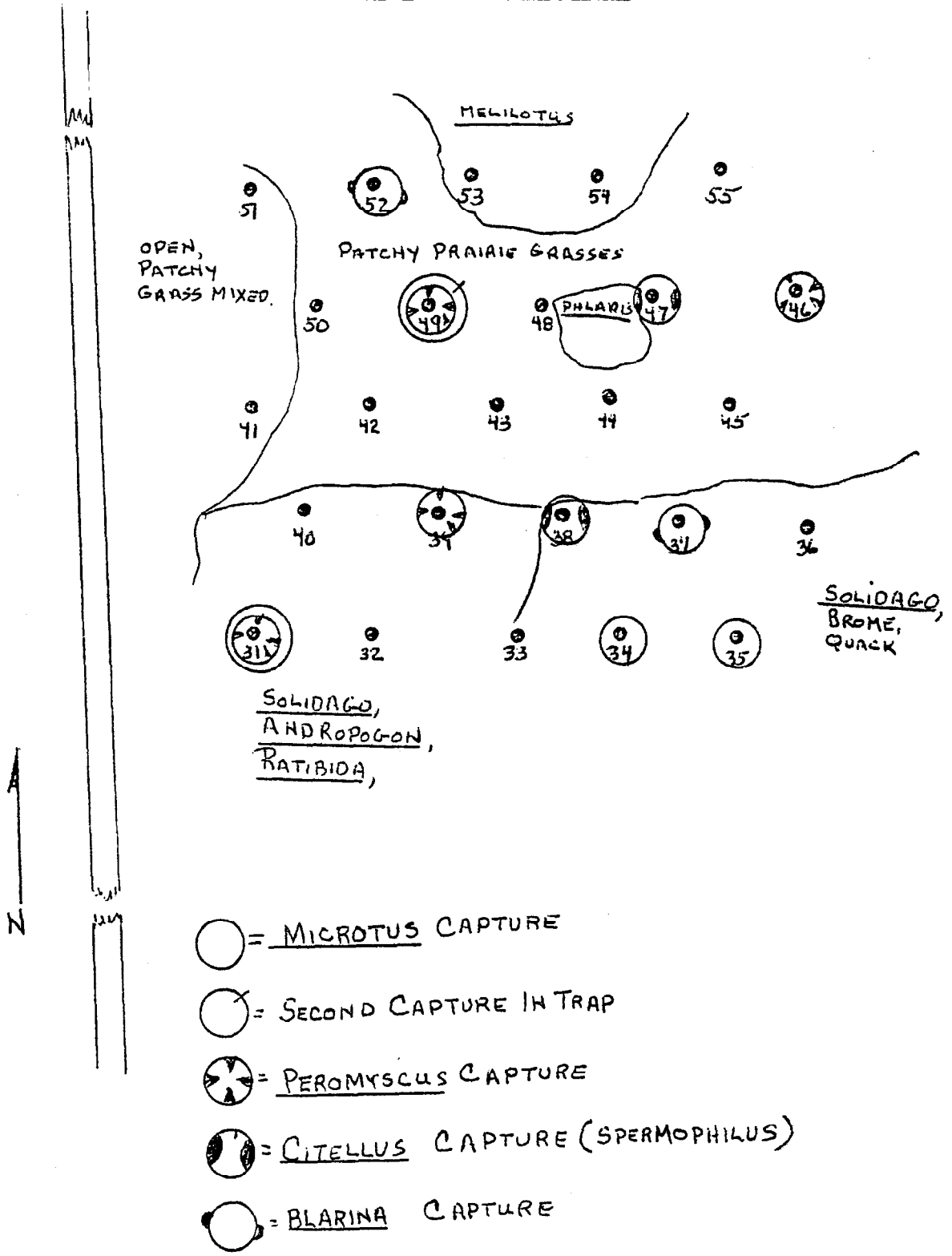
3. The young size of the Spermophilus may indicate a breeding population inside the ring; these were the only ones captured in prairie sites 1 - 8.

4. The Solidago enriched areas appear associated with the most captur

5. The Peromyscus population was somewhat more spread out.

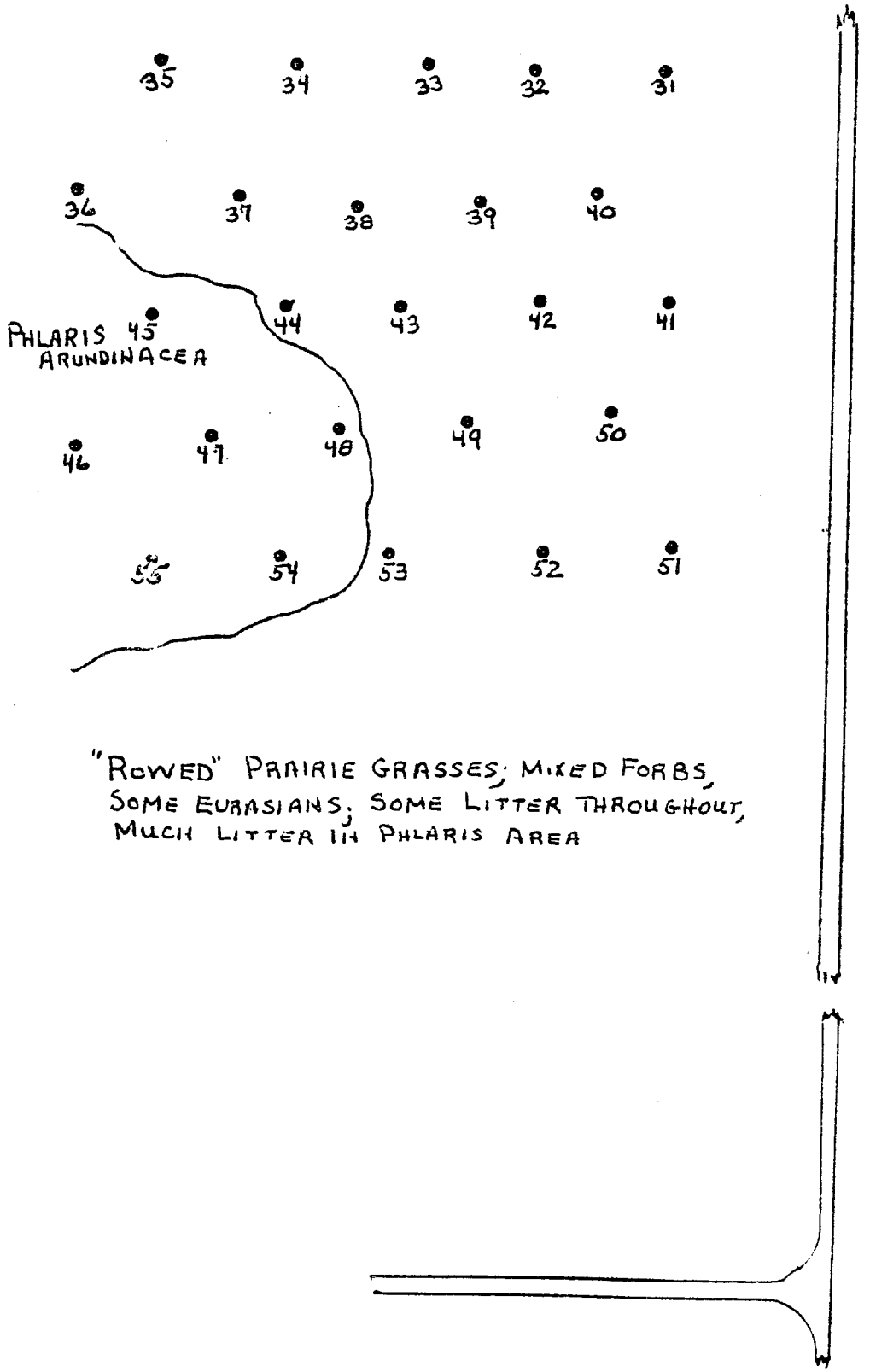
PRAIRIE #7
7/15 - 7/19/85

TOTAL TRAP CAPTURES



PRAIRIE #3
7/8-7/12/85

TOTAL TRAP CAPTURES



"ROWED" PRAIRIE GRASSES; MIXED FORBS, SOME EURASIANS; SOME LITTER THROUGHOUT, MUCH LITTER IN PHLARIS AREA

Short Grass Control
7/22 - 7/26/85

In an attempt to find an area which was protected from burning over the last ten years, a plot outside the ring and across Eola Road was chosen. The main vegetation was determined to be a Bromus/Poa mix with patches of Trifolium and Daucus intermixed. There was noted a small stand of pine and spruce- in the southeast corner of the 1/4 acre plot. Being a non-burned area, it was hoped to obtain a "normal" population number from the trappings done on this site.

7/22/85: 10:47, 75°, hot and sunny. Traps baited, none of the 25 traps placed in the field on the previous Friday had any residual bait remaining.

1318: hot, 80°, sunny. No signs of trap activity; a Spermophilus was visually seen along roadside near traps.

(no activity)

7/23/85: 9:28, 70°, sunny and dry overnight
#36,37,38,42,49,50 & 54 showed activity, scat or tripped.
#40,43,44,46,52 & 55 had bait gone, not tripped (insects??)
#32 juvenile female Microtus, new, RR4, Poa.
#33 juvenile female Microtus, new, LR1, Bromus.
#35 adult female Microtus, new, LR5, Pinus/Bromus.
#39 young male Microtus, new, LR2, Bromus.
#45 adult male Microtus, new, RR1, Bromus.
#48 juvenile female Microtus, new, LR4, Bromus.
#53 juvenile female Microtus, new, RR5, Bromus.

(7 Microtus captures, all new)

1327: hot, 83°, sunny and humid.
#32 & 39 tripped with bait gone
#38 & 48 not tripped, bait cleaned out (insects??)
#39 adult male Microtus, new, dead in trap, (entangled) Poa/Bromus

(1 Microtus, new, dead in trap)

7/24/85: 9:26, 73°, hot and sunny, dry overnight.
#32,33,39,43,44,54 tripped with signs of activity.
#35,36,42,47,49,55 bait missing, no signs of activity
#31 adult female Microtus, new, RR2, Trifolium
#37 juvenile female Microtus, new, LR3, Bromus/Pinus.
#40 adult female Microtus, new, LF2, Trifolium.
#45 adult male Microtus, recap, RR1, Bromus.
#46 adult male Microtus, new, LF3, Daucus
#48 juvenile female Microtus, new, RR3, Bromus.
#52 juvenile female Microtus, recap, RR5, Bromus/Poa

(7 Microtus, 5 new-2 recap)

1354: 80°, hot, sunny, field dry.
#38 tripped and cleaned
#55 cleaned, not tripped
#32 adult female Microtus, new, LF4, Poa.
#44 juvenile female Microtus, new, LF5, Bromus (sluggish)

(2 Microtus, both new)

7/25/85: 70°, humid, overnight rain but floor of field dry; 9:32.
#36,37,38,39,43,44,46,47,48,51,55 tripped and shows activity
40 cleaned, no activity
35,49,52 & 53 sprung, no activity
#31 adult female Microtus, new, LF5, Trifolium/Poa.
#32 adult male Spermophilus, new, RF1 (first one!)Poa.
#34 juvenile male Microtus, new, RF5, Bromus/Pinus.
#42 adult female Microtus, new, RF4, Bromus.
#45 adult male Microtus, recap, LF3, Bromus.
#54 adult female Spermophilus, new, Bromus.

(6 captures; 4 Microtus: 3 new, 1 recap; 2 new Spermophil

1515: showers, field wet, overcast, 70° windy.
#37 cleaned, no activity
#35,38,39,43,44,50,52 &53...sprung, no signs of activity(rai
#42 adult female Spermophilus, new, LF4, Bromus.

(1 Spermophilus, new)

7/26/85: 9:00, 70°, following night of storms; field very wet. sunny.
#32,41,45,49 tripped with signs of activity
#36,40,43,48,52 bait cleaned off, no activity signs (scat, e
#35 & 42 sprung, no activity, bait intact.
#37 adult female Microtus, new, Lf4/RF1, Bromus.
#38 young female Microtus, new, RF5, Bromus.
#39 juvenile female Microtus, recap, RR5, Bromus.
#46 adult female Microtus, new, LF4, Poa.
#55 adult male Microtus, recap, LF3, Bromus.

(5 Microtus captures; 3 new-2 recaps)

1210: 75° sunny and clear sky.
#52 sprung, no activity
#55 gate pulled forward
#35 adult male Spermophilus, unmarked, new, Pinus/Bromus.
#41 juvenile male Microtus, new, not tagged, Poa.
#44 adult male Microtus, recap, LF3, Bromus.
#45 adult female Microtus, recap, LF4, Bromus.

(4 captures: 1 Spermophilus, new; 3 Microtus, 1 new, 2 r

Estimated Populations:

1. Lincoln/Peterson Index:
   A. Microtus: $\frac{14 \text{ original} \times 7 \text{ new}}{3 \text{ recaps}} = \frac{98}{3} = 32.9/\frac{1}{4}$ ac

   B. Spermophilus: sample too small to calculate

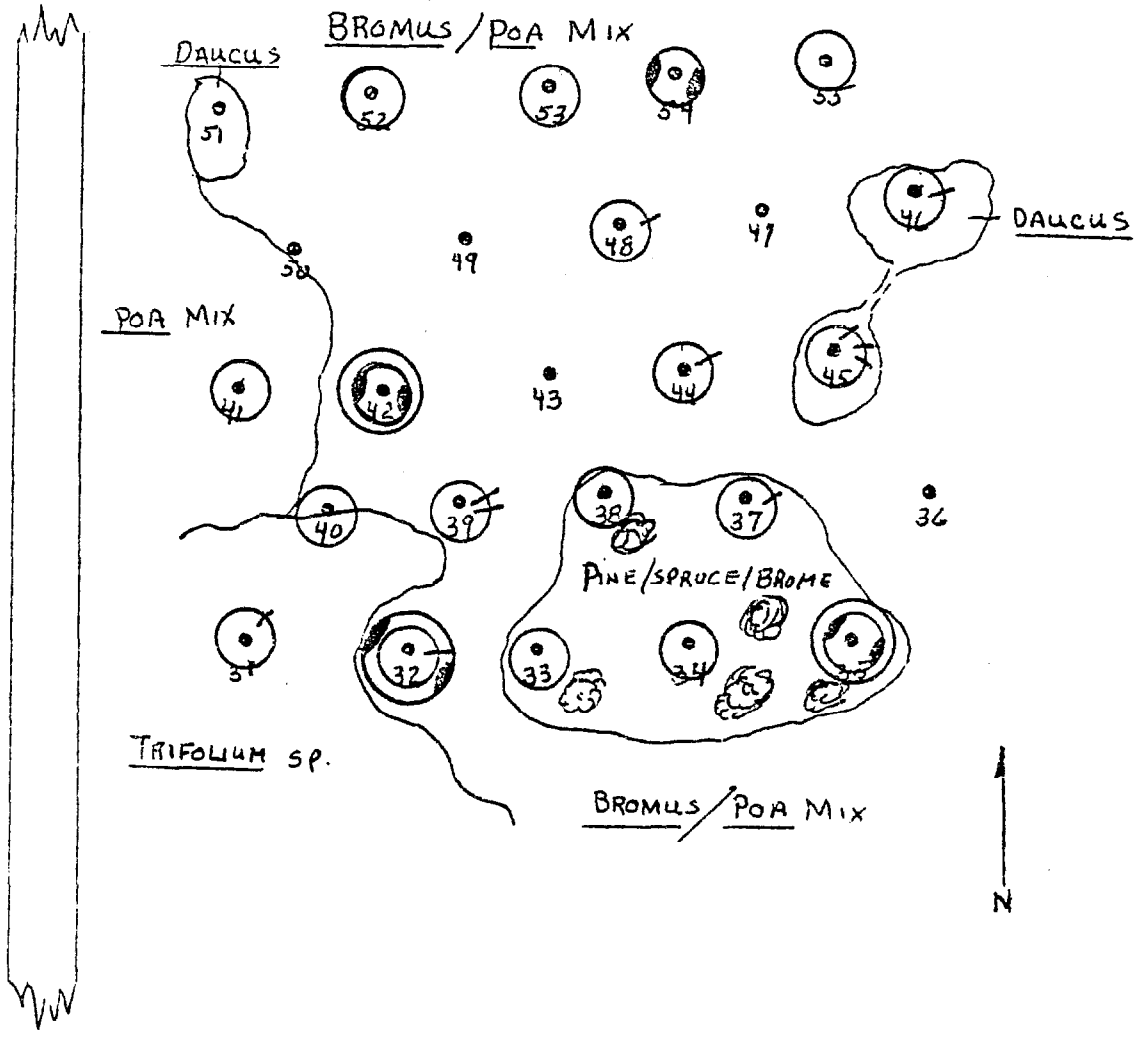
2. Actual Minimal Count:
   A. Microtus: young male 1; juv. male 2; adult male 4 = 7 mal
   young fems 1; juv. fems 7; adult fems 7==15 fem
   22 tot
   per ¼ ac

   B. Spermophilus:
   2 adult males; 2 adult females= 4/¼ acre

   C. Microtus: 88 individuals per acre
   Spermophilus: 16 individuals per acre

SHORT GRASS
CONTROL PRAIRIE
7/22-7/26/85

TOTAL TRAP CAPTURES



○ = MICROTUS PENNSYLVANICUS

◔ = SECOND CAPTURE IN TRAP

◑ = SPERMOPHILUS TRIDECEMLINEATUS

Prairie Site #8
7/22 - 7/26/85

This is a three year old prairie with a very patchy appearance. There is a very heavy concentration of Melilotus along the southern border and islands of Solidago throughout. The main grasses are a mix of Sorghastrum and Andropogon with an understory of Poa. There is a good variety of prairie forbs scattered throughout. A cottonwood grove made an intrusion near the uthwesterr southwestern edge of this trapping area. As in previous samples,' 25 traps in a grid formation were used with 21' between rows and between traps. The grid encompassed 1/4 acre. Traps were placed in the field on 7/19 for acclimatization purposes.

7/22/85: 9:02, traps baited and set, 75°, breezy and dry. 20 of the 25 traps had no residual bait from Friday.

1400: 80°, hot and dry.
#23 adult female Microtus, nursing, LR2, Melilotus.

(1 Microtus, new)

7/23/85: #1 & 21 tripped with scat (sunny, dry, 80°) 10:41.
#10 cleaned, NA
#4,5,6,7,8,9,14,15 & 16 scat, not sprung
#2 adult male Microtus, , new, LR2, Melilotus.
#12 adult male Microtus, new, LR3, Melilotus.
#19 young male Microtus, new, LR5, Melilotus.
#20 adult female Microtus, escaped, new, Melilotus.
#21 gate forward, cleaned
#22 adult male Microtus, new, LR4, prairie fringe

(5 Microtus, all new captures)
Note: there is a male and a female LR2)

1355: hot, dry...
No activity seen at this time; 3 baby redwing blackbirds in nest between sites 5 and 6.

7/24/85: sunny, 70°, dry overnight, 10:32.
#1&2 tripped with scat
#18 cleaned, NA
#11 & 12 sprung, no activity obvious
#8 adult female Microtus, new, RR5, Solidago/Poa.
#10 adult male Microtus, recap, LR2, Melilotus/Poa.
#23 adult female Microtus, recap, LR2, Melilotus.

(3 Microtus, 1 new, 2 recaptures)

1430: breezy, hot, 85°, bright sun.
#20 adult female Microtus, recap, LR2, dead in trap (heat??)
#23 sprung, NA

(1 Microtus, recapture, dead in trap)

7/25/85: 10:42, 70°, cool and humid, early morning showers, very humid overnight.
#1 & 18 tripped with scat evident
#13 cleaned, NA
#10 sprung, bait intact
#11 adult female Microtus, recap, LF3, Melilotus/Poa
#21 young female Microtus, new, LFL/RF1, ill in trap, Melilotu
#22 adult male Microtus, recap, LR4, Andropogon.
#23 adult male Microtus, new, LF3, Melilotus.

(4 Microtus, 2 recaps and 2 new)

1350: cool, 70°, heavy rains...no activity during this check.

7/26/85: 9:57, 70°, sunny and windy following evening/night rains; many traps (10) torn up and displaced by some animal during the night.
#1;12,16,17,19,21,22,23,24,25 all torn up
#2 cleaned, NA
#20 scat
#10,13 & 18 sprung, but bait intact

(no captures)

1315: 75°, sunny and dry.
#25 adult male Microtus, recap, LF3, dead in trap.

(1 Microtus, recap, dead in trap)

Population Estimates For Prairie Site #8:

1. Lincoln/Peterson Index Technique:

$$\frac{7 \text{ original individuals} \times 5 \text{ new sample}}{3 \text{ recaptures}} = \frac{35}{3} = 11.7 \text{ / } \tfrac{1}{4} \text{ acre}$$

2. Actual Trap Count: 4 trapdays:

1 young male; 0 juvenile male; 4 adult male= 5 males
1 young fem; 0 juvenile fem; 3 adult fem.= 4 fem

9/¼acre

General Concluding Observations:

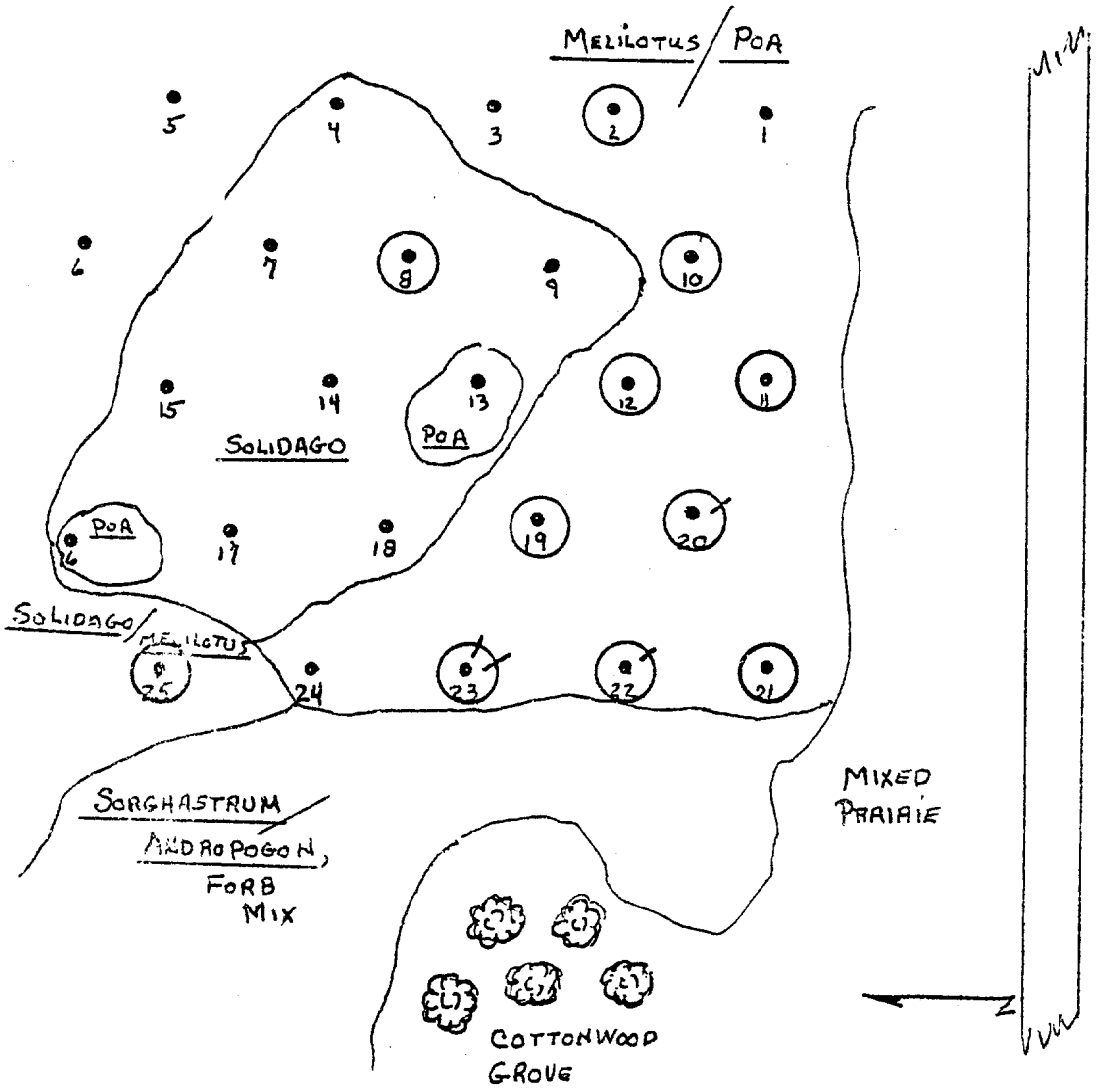
1. This young, patchy prairie supports a minimum of 9 Microtus per ¼ acre, or 36/acre by actual sighting.

2. Population may be as high as 47 (46.8) per acre using the Lincoln Index.

3. The heavy Melilotus growth is almost impossible to walk through, but appears to harbor the greater number of the Microtus taken in the traps, only 1 of the 15 captures/recaptures was outside the Melilotus area.

4. The presence of a young female and young male, along with the recaptures indicates an established population as oppossed to one of a transient nature.

TOTAL TRAP CAPTURES



○ = MICROTUS PENNSYLVANICUS

○ = SECOND CAPTURE IN TRAP

Prairie Site #1
8/19 - 8/23/85

This represents a second sample of the same area previously trapped 7/1 - 7/5/85. The identical 1/4 acre perimeter was used in this sample and in the previous sample. The trap locations were again set in a 5 x 5 grid with 21 feet between traps and also between rows.

The major difference immediately obvious to the eye is the increased height of the prairie plants, especially the towering 6 -7 foot growths of the dense Andropogon and Sorghastrum species.

The traps were prebaited and placed open in the field on Friday, August 16, 1985. All of the 25 traps were devoid of residual bait when the traps were set on 8/19.

8/19/85: 9:55, 60°, cool overnight, prairie dry underfoot. The 25 traps were freshly baited with the peanutbutter-rolled oats mixture. None of the 25 traps had residual bait remaining. Some large feces remains were noted on trap #1, appears to be Citellus.

1340: 65° partly cloudy. No signs of any activity in the field at this time.

(No captures at this time).

8/20/85: 9:00, cool with temperatures an unseasonal 52° overnight, 57° and cloudy at trap check time, ground dry.
#1 sprung, NA
#3 dead adult male Microtus pennsylvanicus in trap with young male, 8" body, longtail weasel. Mustela frenata. (the Microtus was dead, but no signs of being devoured)
#5 juvenile male Microtus, new, RR1, Sorghastrum
#10 adult female Microtus, pregnant, new. tumor on right chest area, RR2, Solidago.
#11 juvenile female Microtus, new, RR3, Andropogon
#13 bait gone, NA on door.
#14 young female Microtus, new, RR4, Andropogon.
#15 adult female Microtus, new, LR1, Andropogon.
#17 adult female Microtus, new, pregnant, LR2, Andropogon.
#20 adult female Microtus, new, LR3, Desmodium.
#21 trap cleaned, gate swung forward

(8 new Microtus, 1 y female; 2 j, 1 male, 1 female; 5 adults, 4 females, 1 male(dead in trap) and 1 longtail weasel, Mustela frenata)

1400: overcast, 70°, mosquitoes out for first time this summer.
#13 young male Microtus, new, RF2, Andropogon.
#17 adult male Microtus, new, RF3, Andropogon.

(2 Microtus, one young male, 1 adult male, both new)

Prairie Site #1
(cont.)

8/21/85: 9:11, 60°, cool, dry with clear skies; 52° overnight.
#3 tripped, NA
#4 adult male Microtus, new, RF4, Andropogon.
#9 bait gone, NA
#11 adult male Microtus, new, chest tumor. Andropogon. RR5.
#14 young female Microtus, new, LR4, Andropogon.
#15 adult female Microtus, recap, dead in trap, LR1, Andropog
#17 adult female Microtus, pregnant, recap, LR2, Andropogon.
#21 cleaned, door jammed by grass stalk.
#22 adult female Microtus, recap LR3, stupor, Andropogon, (left in stupor on ground, missing at 1400, very young Microtus left on ground, skull crushed....Mustela???)

(6 Microtus, 3 recaptures and 3 new)

1330: 75°, clear and dry, sunny skies.
#6 adult male Microtus, new, LF4, (open sore on chest, may be male from July 1 trapping in area)
#11 adult female Microtus, recap, RR2, tumor on chest, Andropogon. (third animal in this site with chest sore)
#12 tripped, NA
#14 adult female Microtus, pregnant, recapture, LR2, Andropogon.
#15 tripped and cleaned
#22 very young male Microtus, head crushed by trap, new (possible killed by Mustela ??) Andropogon.

(4 Microtus, 2 recaptures, 2 new)

8/22/85: 9:02, 70°, sunny and dry.
#1 tripped, NA
#2 field cricket on bait
#8 red ants on bait
#11 torn out of ground, shrew scat
#12 adult female Blarina brevicaudata, dead, Andropogon. (first short-tailed shrew captured inside ring)
#14 adult male Microtus, new, LF1, Andropogon.
#15 cleaned, door caught on trap side
#17 young female Microtus, LR4, recapture, Andropogon; in stupor and near death, left by side of trap.
#21 scat, sprung and cleaned trap
#22 carcass of young Microtus missing from previous day.
#23 adult male Microtus, sore on left chest, RR 5, recapture, Andropogon.
#24 adult female Microtus, recapture, LR2, Andropogon/Desmod

(5 captures: 4 Microtus..1 new, 3 recaps; 1 Blarina, ne

8/22/85: 1345, 72°, sunny, high humidity; dry; rain forecast for p.m..
#11 replacement trap placed in field
(blooming Liatris by trap 11)
#15 adult male Microtus, recapture, RF3; Sorghastrum.
#16 sprung with gate forward
#17 "stupor" beast dead left by trap.
#24 adult female Microtus, recap, LR2, Andropogon.

(2 Microtus, both recaptures)

8/23/85: 9:17, 72°, hazy, humidity building, showers overnight, prairie wet, prairie floor just damp, no standing water.
#3 tripped, N.A.
#4 tripped, Microtus scat.
#6 Sorex cinereus, masked shrew, adult female, new Andropogon; alive in trap! RF_1.
#14 tripped, long horned katydid in trap!
#17 adult male Microtus, recapture, RF_3, Andropogon, (body of dead Microtus still in place overnight)
#21 adult male Microtus, recapture, RR_5, lump on chest; Andropogon; trap destroyed
#23 bait gone, N.A.
#24 adult female Microtus, recapture, LR_2, Andropogon.
#25 bait gone, N.A.

(3 Microtus, all recaptures; 1 Sorex, new)

12:15, hazy, 75°
#15 adult male Microtus, recapture, RF_3, Sorghastrum.
#23 juvenile female Microtus, new, not tagged, Andropogon.

(2 Microtus captures, 1 new, 1 recapture)

Estimated Populations:

1. Lincoln/Peterson Index:

A. Microtus: $\frac{15 \text{ original} \times 6 \text{ new}}{4 \text{ recaptures}} = \frac{90}{4} = 22.5/\frac{1}{4}\text{Acre}$

(Blarina, Sorex and Mustela too few for indexing)

2. Actual Minimal Counts:

A. Microtus:

adult male: 6, juv male: 1, young male: 2 = 9 males
adult fems: 4, juv fems: 2, young fems: 2 = 8 fems
total: 17/¼ Ac.

B. 1 each of Sorex cinereus, Blarina brevicaudata, and Mustela frenata, captured per ¼ acre.

C. Projected populations per acre·

1. Microtus: 68 per acre

2. Blarina, Sorex and Mustela each at 4 per acre.

Observations:

1. The most obvious observation is the vast increase in the population since the same area was trapped 6 weeks previously.

2. Not only has the Microtus population blossomed from an estimated 12 per acre to an estimated 68 per acre, (over 500%), but the variety in the species has increased to 4, including two species of shrews and one weasel.

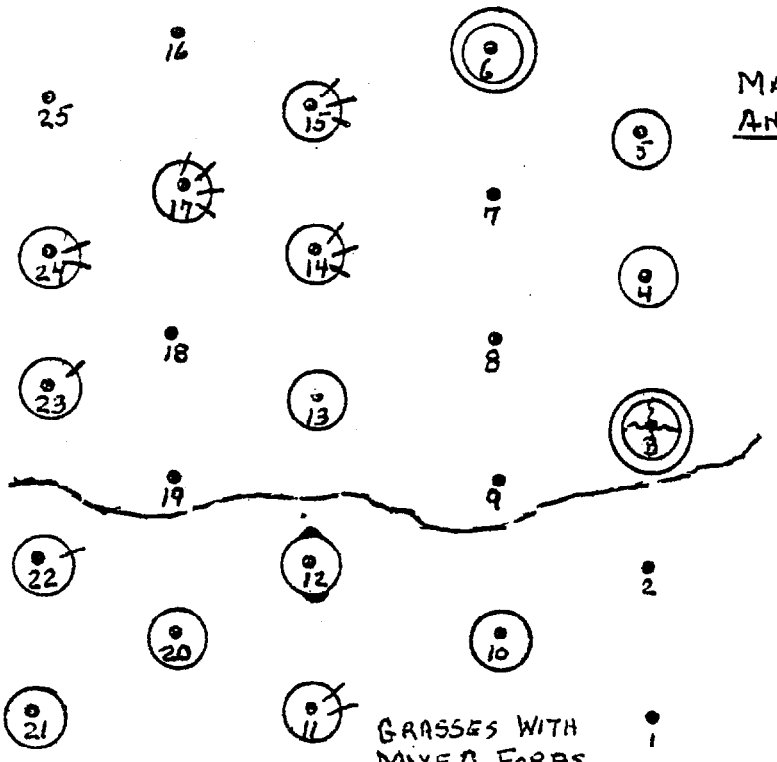
3. The Peromyscus have disappeared.

4. The height of the Andropogon/Sorghastrum community appears to compensate in some way for the lack of litter and floor debris thought essential for a strong Microtus population to exist.

5. If the burnings have been detrimental to the immediate mammal populations, then it appears that the rapid recovery of the species in the harbor/unburned areas is sufficient to rapidly fill in the areas devastated by the burns.

PRAIRIE #1
8/19- 8/23/85

TOTAL TRAP CAPTURES VS. VEGETATION



= MICROTUS

= MUSTELA

= SECOND CAPTURE

= BLARINA CAPTURE

= SOREX CAPTURE

Prairie Site #2
8/19 - 8/23/85

Second sampling of this site. Originally this "older prairie" was trapped 7/1 - 7/5/85 During the 6 weeks since the original sampling, the Andropogon has grown from a mere 2-3 feet to over 6 feet, the forbs are now blooming or have just finished blooming.

Traps placed in a 5 x 5 grid covering 1/4 acre and spaced 21 feet between sites. Peanut butter and rolled oats were used to make a bait compound. All of the prebaited traps placed open in the field on 8/16 were cleaned of their bait.

8/19/85: 11:00, 65°, traps freshly baited and left set in position: all residual bait had been removed by some organisms over the weekend.

(no active signs at this time)

1415: #31 adult female Microtus, recapture from 7/1, pregnant, LF1, Andropogon.(counted as "new" here)
#36, 41..tripped with scat
#45 adult male Microtus, new, RF4. Andropogon.
#51 adult male Microtus, new, LR2, tall Coreopsis.

(3 captures, 2 new adult male Microtus; 1 adult female Microtus, recapture; counted as new(7/1 orig.)

8/20/85: 10:07: 60° with a low of 52 overnight; dry on praibie; cloudy and breezy.
#36 scat on door
#41 LR3 (recap from July) adult male Microtus,
#42 LF1, adult female Microtus, recapture, Andropogo
#43 juvenile male Microtus, new, LR1, Andropogon.
#45 & 46, tripped and cleaned
#49 adult female Microtus, new, LR4 (BIG ONE!) Andro
#55 gate stuck on grass; piles of scat on foot/gate.

(4 captures, 2 new..j male & adult female;
2 recapture, 1 adult male & 1 adult female) (Microtus)

1430: cloudy, 70°, cool and dry.
#37 adult male Microtus, new, RR2, tall Coreopsis.
#43 adult male Microtus, recap, RF4, Andropogon.
#47 sprung, NA
#53 adult male Microtus, recap, LF2 Andropogon.
(counted as "new", original cap was 7/3 sample)
(3 captures, 1 new adult male Microtus, 2 recaptured adult male Microtus)(count LF2 as new for this study

Prairie Site #2
(cont)

8/21/85: 10:19: 70°, clear and dry; cool 50's overnight.
#31,34,37,39 & 41 all tripped with bait gone.
#42 adult female Microtus, recap, LF1, Andropogon.
#44, 45 & 47 all tripped and cleaned.
#46 adult male Microtus, new, dead in trap, Andropogon.
#53 adult male Microtus, recap, LF2, Andropogon.
#55 adult female Microtus, new, LF4, Andropogon.

(4 Microtus, 1 new and 3 recaptures.)

1422: 75°, clear and sunny, ground very dry.
#32 adult male Microtus, recap, Andropogon.-R_3
#41 adult female Microtus, lump in center chest, recap, Andropogon.
#42 tripped, gate forward.
#43, 44, 45 all tripped and cleaned, scat on 43 & 45.

(2 Microtus, both recaptures.)

8/22/85: 10:00, 70°, sunny, dry, rising humidity
#31 torn up, musk odor; Blarina scat
#32 adult female Blarina, nursing, RR1, Andropogon.
#34, 38, 39, 43, 45, 46, 47, 52 & 57 all have bait missing and door sprung; most also do not have a lower bait tray on bottom of trap.
#40 adult male Microtus, dead in trap, recapture, chest sore, LR3, Andropogon.
#41 adult female Microtus, recapture, dead in trap, LF1, no longer pregnant, Andropogon.(freq. recap)
#44 adult male Microtus, new, RF3, Sorghastrum.
#50 adult female Microtus, new, RR1, Solidago.
#51 adult male Microtus, new, LF2, Andropogon.
#53 adult male Microtus, recap, dead in trap, LF2, Andropogon
#55 adult male Microtus, new, RR3, Andropogon.

(8 captures: 7 Microtus, 4 new-3 recap; 1 Blarina,new

1428: 70°, overcast, high humidity, field dry.
#41 adult female Microtus, big lump on chest, recap, tagged as RF1, Andropogon.
#45 juvenile male Microtus, new, RR5, Andropogon.
#47 sprung, door caught on grass stem

(2 Microtus captures, 1 new, 1 recap)

Prairie Site #2
(cont)

8/23/85: 10:11, 72°, hazy; overnight rain, prairie wet, floor damp; pair of Spermophilus observed on edge of road, 100 feet from trapsite of Prairie #2, entered burrow along roadside.
#34 adult female Microtus, new, RR_4, Sorghastrum/ Andropogon
#35 cleaned of bait, N.A. (insects?)
#38 cleaned, Microtus scat present
#39 cleaned, N.A.
#40 tripped and cleaned
#41 adult female Microtus, recapture, RF_1, lump on chest; Andropogon.
#43 gate forward, Microtus scat
#44 tripped, N.A.
#45 cleaned, gate forward
#46 tripped, cleaned
#47 cleaned, door of trap stuck on side of tunnel
#50 cleaned, gate forward
#54 cleaned, Microtus scat
#55 tripped, Microtus scat

(2 Microtus, 1 new, 1 recapture)

1252: 75°, cloudy and very humid, rain threatening.
#37 adult male Microtus, recapture, RR_2, Andropogon.
#45 tripped, N.A.
#49 field cricket in trap eating bait.
#50 adult male Microtus, recapture, LF_3, Andropogon.

(2 Microtus, both recaptures)

Estimated Populations:

1. Lincoln/Peterson Index:
   A. Microtus: $\frac{11 \text{ original} \times 13 \text{ new}}{7 \text{ recaptures}} = \frac{143}{7} = 20.4/\frac{1}{4}$
2. Actual Minimal Count; Microtus:
   adult male:9 , juven male 2 , young male 0 = 11 m
   adult fems:6 , juven fems 0 , young fems 0 = 6 f
   17 t
   1 adult female Blarina per ¼ ac

OR

68 Microtus per acre and 4 Blarina per acre

Observations:

1. As with Prairie Site #1, the most astounding difference seen in this second trapping session is the rapid increase in the Microtus population. It has increased from an estimated 12 per acre to an estimated 68 per acre.

2. As with Prairie #1, there was no evidence of the Peromyscus.

3. The two variable factors in the trapping periods were the increased growth of the overstory of the prairie grasses and the passage of 6 weeks of time since the original trapping study.

4. Blarina did show up in a single capture.

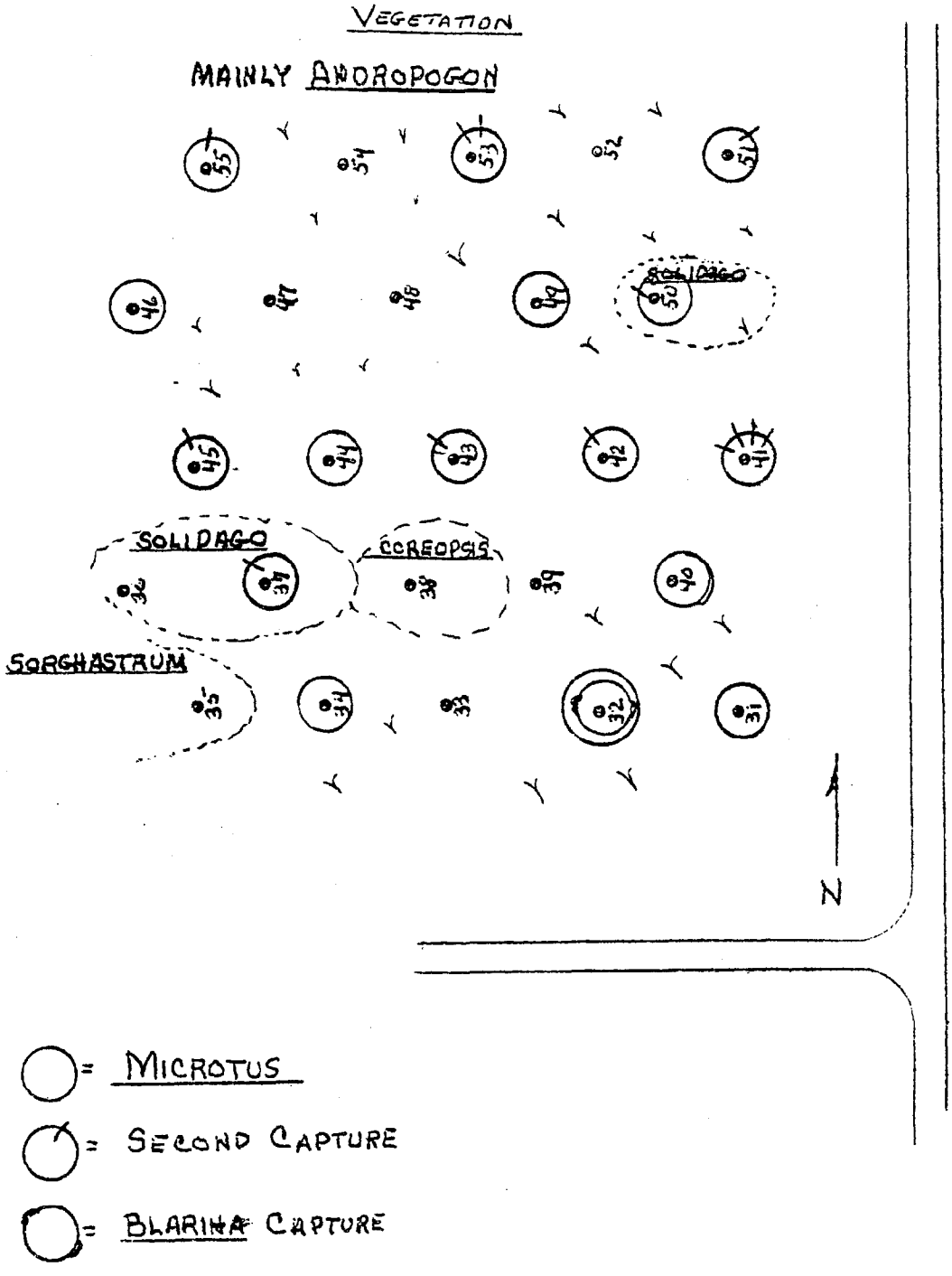
5. Although none were captured in the live traps, it is noteworthy to mention the observation of two Spermophilus running into a burrow along the eastern perimeter roadway of this site.

6. As with Site #1, the original trapping message was that the burnings had devastated small mammal population in the prairie, and that it is a "trade-off", mammals for prairie plants. This may be partially true as the low capture numbers in July indicate. However, the high population captured in August appear to contradict the possible devastation of he burnings.

7. Probably noteworthy to again mention that there is little to no ground litter and it appears the 6-7 foot tall growths of the prairie grasses offer sufficient protection for the activity of the Microtus population.

PRAIRIE #2
8/19- 8/23/85

TOTAL TRAP CAPTURES VS VEGETATION



○ = MICROTUS

○ = SECOND CAPTURE

○ = BLARINA CAPTURE

Concluding Remarks:

During the months of June, July and August of 1985, eight different prairie sites were live-trapped in an attempt to estimate the number and species of small mammals present. Twenty five modified Fitch livetraps were used in a grid pattern with 21 feet between traps and between rows. The samples each covered approximately one quarter of an acre. The traps were baited with a rolled oats, peanutbutter mixture and were checked for captures at 9 a.m. and again at 2-3:00 p.m. daily, Monday through Friday. The captured beasts were individualized by toe coding, removing no more than one digit per foot and trying to remove only the toenail from the tagged toe.

The original premise of this field project was that the annual burning of the prairies was really a trade off; prairie plants being given a better chance to survive, but at the expense of the native small mammals and ultimately at the expense of the predators of these mammals.

The preliminary results supported the hypothesis, with the unburned and fewest burned sites offering the highest mammal populations. In an attempt to further substantiate these findings, the two most-burned areas, sites #1 and #2 were trapped again, six weeks after the original work was concluded on the same sites.

The second trappings of the most burned sites offered some astounding results. Not only had the estimated Microtus population risen over 500% from the original estimates, the number of species captured was among the highest in the areas sampled. Included in this second sampling was the capture of one Microtus predator, the long tailed weasel (Mustela frenata). Both Sorex and Blarina shrews were also captured in these "most-burned sites" the second time around.

In all of the literature, it is assumed that a dense ground litter is essential for the tunneling of the voles (Microtus), and without such cover, the populations will not be well developed. It goes without saying that the burnings destroy the ground litter. However, it is now time to question this time-honored idea of the essential need of the litter. It appears that the Microtus, and others can survive very well if there is sufficient growth, be it ground litter or tall grasses. The most striking difference in the sampling of the Prairie Sites # 1 & 2 in July and again six weeks later, was the mushrooming growth of the Andropogon and Sorghastrum prairie grasses. These grasses grew from a mere 2-3 feet in July to over 6-7 feet in August. In a period of 6 weeks the grasses grew, and coincidentally, so did the small mammal population.

Perhaps there is an initial devastation of the small mammal population following a prairie burn. But evidence gathered this summer appears to point out that in time, the population rebounds. There appear to be enough "harbor" or unburned areas within the prairie sites themselves, which offer protection for enough of the mammals so that given time after a burn, they will repopulate the burned areas. The variety and numbers of species on the Fermi Prairie indicate that this is not a long-term tradeoff, and indeed it is possible to have both the flora and the fauna of the prairie and not just one or the other.

Some Random Observations, Possibly Worth Future Consideration :

1. As is obvious from the data of this paper, the populations appear to fluctuate with time and perhaps maturity of the vegetation. Perhaps several sites should be sampled throughout the season to better picture the population fluctuations of the mammals. Care must be used so that the animals do not become "trap-happy".

2. It was noted that Sites #1 & 2 showed an amazing increase in numbers and individuals over a 6 week period. Did the other sites show a similar change? If not, did the other areas with their Poa and Bromus coverings reach their mammal carrying capacity earlier and serve as the source for the influx of mammals into the sparsely populated areas?

3. Although not thought of as a desirable native prairie plant, there did appear to be a positive correlation between the presence of Solidago altissima and mammal captures, especially when considering the Peromyscus maniculatus.

4. On Site 8, a definite correlation between the Melilotus officinalis and number of Microtus; with about half of the trapping area in the thick growth of Melilotus, only 1 of 15 total captures was made outside of the Melilotus area.

5. I do not know the significance, if any, of the fact that 4 of 17 Microtus captured in Prairie Site #2 during August had large lumps on the chest. All four were adults, some male some female. During the summer, only one other male was observed to have this malady. I don't know if these beasts are prone to this type of disturbance, if it is a malignancy, parasite or caused by environmental factors. As I said, it may not even be significant, but I felt 4/17 having the affliction was worth mentioning.

6. The populations I have recorded are actual minimal populations based on captures and toe-coding. The Lincoln-Index is just a probability tool as is the "next-trap" statistic of some other researchers. I feel there are many variables which will determine the actual populations: type and age of bait used, type and size of trap opening; time (season) of the year trapping; competition with other species; sensitivity of the trap trip levers; etc. As long as the same routine is used in all cases one will be able to compare apples to apples. But, more accurate results can be obtained through better technique and better trap design.

7. I cannot explain the exclusive population of the Peromyscus in Site 5 early in the summer. It would be interesting to see if this enclave maintained itself throughout the year.

8. In some areas the invasion of the Spermophilus causes changes in the activity and population of the Microtus. It does not appear that the Spermophilus invade the tall grass prairie to any significant level.

9. The Appendix includes a list which was taken on observation of the per centage of traps which had the bait removed during the acclimatization period over each weekend and the final total mammal population. This may be a useful tool to determine if there will be much success in trapping, but as the results indicate. not always reliable.

10. The traps whose baitpans beneath the peanutbutter were missing or destroyed, more often showed bait missing and no mammal activity. I assume this was primarily due to small soil organisms coming in direct contact with the bait food. This in turn, skewed the results as it meant that if the bait was taken by insects, that trap was in effect "not baited" and may not capture a mammal.

11. If possible, it seems that as the prairie establishes itself, burnings could be done once every 2-3 years. It would make an interesting study to see the differences, if any, on the small mammal populations on an annually burned area as opposed one burned every 2-3 years or more.

12. If time and skill permitted, a stomach content analysis of the food eaten by the Microtus, Peromyscus might give some insights as to which prairie plants are used in their diet most commonly.

13. With the grid pattern. if would be possible to calculate the actual home range of each species and see if there were changes in the size of this area with population and seasonal fluctuations.

14. Temperature, humidity and other environmental factors could be studied as factors influencing the movements of the mammals.

15. Peromyscus specimens will usually eat all of the bait and will cower in the rear of the trap, Microtus will defecate on the bait, eat some and will actively run into the trap runway. These two species show different trap behavior.

16. Is there a correlation between insect species/numbers and small mammal populations? Does the burn devastate the insects as well as the initial mammal population?

Respectfully Submitted, 9/15/85

Henry S. Robarts, III

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Weekly Small Mammal Trapping Schedule

Friday: Finish 1400 collecting trip of traps and move traps to new locations; leave bait in traps, but do not set traps; bait may be taken over the weekend.

Monday: Bait and set traps during the 9:00 field period. Note per cent of traps which had bait removed over weekend as a potential indicator of biological activity. Check traps at 9:00 and 14:00 daily.

Tuesday: Check traps, toe-code any captures and record the traps utilized, the age, sex and species. Note the type of vegetative species closest to the trap.

Wednesday: Same as Tuesday; make a rough habitat map of the trap area, indicating the vegetative features and the trap numbers and locations in the field.

Thursday: Check traps at 9:00 and 14:00; record captures; start recording recapture data for use with Lincoln Index for population determination.

Friday: Continue checks; mark off new field in 104' x 104' square; make a staggered grid with traps every 21 feet. Move traps in a large plastic garbage bag to their new sites and leave unset in field until the following Monday

SPECIES AND NUMBER OF INDIVIDUALS DURING A SMALL MAMMAL CENSUS IN 10 PRAIRIE SITES OF 100' X 100', FERMI LAB, SUMMER OF 1985.....

Trap Locations	Dates of Trapping	Number of Burns	Microtus	Peromyscus	Spermophilus	Blarina	Mustela	Sorex	Major Vegetation
Solidago Woods	6/24 6/28/85	3	14	-	-	-	-	-	Solidago dom.; Bromus/Poa
Brome/Poa Field	7/22 - 7/26/85	0	22	-	4	-	-	-	Bromus/Poa Mix
* Prairie Site #1	7/1-7/5 8/19-8/23	5	3 - 17	1 - 0	0 - 0	0 - 1	0 - 1	0 - 1	Andropogon/ Sorghastrum, forbs
* Prairie Site #2	"	5	3 - 17	1 - 0	0 - 0	0 - 1	0 - 0	0 - 0	" "
Prairie Site #3	7/8 - 7/12/85	5	11	-	-	-	-	2	Andropogon, some Phlaris, forbs
Prairie Site #4	"	5	6	5	-	-	-	-	Patchy prairie, Andropogon, mix
Prairie Site #5	6/24 - 6/28/85	3	-	11	-	-	-	-	Sorghastrum/ Andropogon, forbs
Prairie Site #6	7/15 - 7/19/85	4	11	2	-	-	-	-	Sorghastrum/ Andropogon, Sol.
Prairie Site #7	"	3	5	4	2	2	-	-	Patchy prairie; Solidago/Bromus
Prairie Site #8	7/22 - 7/26/85	1	9	-	-	-	-	-	Melilotus/Solida- go, mix prairie

* Data includes two different sampling times

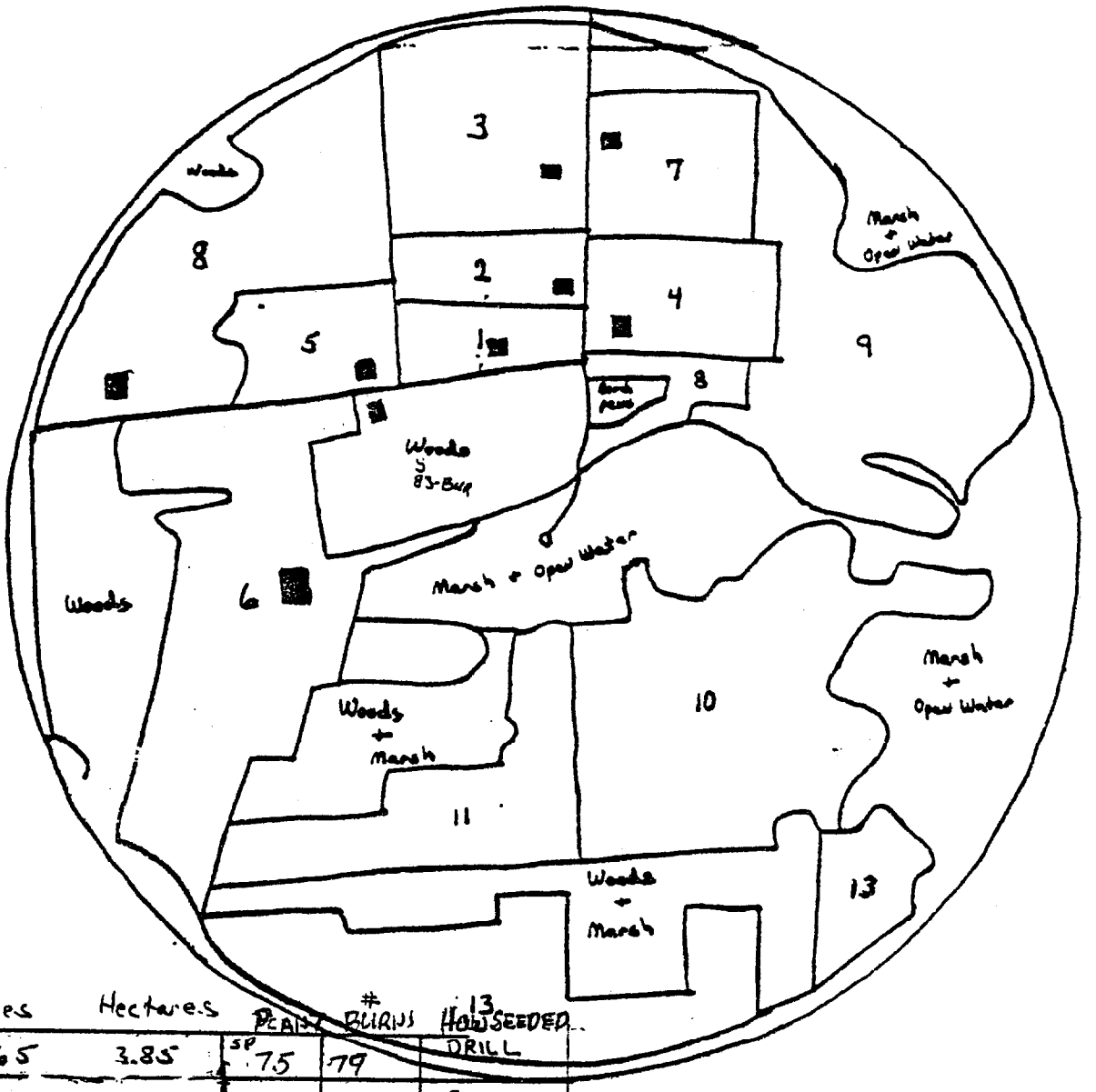
Number of Traps Cleaned Of Bait
Over Each Weekend Move
(Potential Activity Indicator)

Location	# of traps cleaned	Per Centage	Minimum 1/4 A Population **
Solidago Woods	20/20	100	14
Prairie #1	8/25	32	4
Prairie #2	17/25	68	4
Prairie #3	13/25	52	13
Prairie #4	8/25	32	11
Prairie #5	10/25	40	11
Prairie #6	2/25	8	13
Prairie #7	8/25	32	13
Prairie #8	20/25	80	9
Control	25/25	100	26
*Prairie #1	25/25	100	20
*Prairie #2	25/25	100	18

**total of all species actually captured in individuals

■ CONTROL SITE
UN BURNED

Locations Of Trapping Sites Within The Fermi Prairie Site



	Acres	Hectares	PLANT	# BURNS	HOW SEEDED
Plot # 1	9.65	3.85	SP 75	79	DRILL
Plot # 2	10.33	4.20	76	79	SEED DRILL
Plot # 3	32.00	13.00	77	78	SEED DRILL
Plot # 4	16.50	6.70	F 77	79	SEED DRILL
Plot # 5	11.40	4.60	F 78	F 82	SALT SPREADER
Plot # 6	57.90	23.40	F 79	4 82-	HYDROSEED
Plot # 7	17.60	7.10	S 81	3- 83-s	SALT SPREAD
Plot # 8	43.40	17.60	F 81	1 84	SALT SPREAD
Plot # 9	55.80	22.60			
# 10	61.00	24.70			
Plot # 11	28.04	11.36			
Plot # 12	27.96	11.32			
Plot # 13	46.58	18.86			
Plot # 14	28.87	11.69			

■ = SITES OF 1/4A SAMPLES

Totals - 447.03 Acres
180.98 Hectares

Total outside the ring
56.83 Acres
23.01 Hectares

Total inside the ring
390.20 Acres
157.97 Hectares

Map: courtesy of Tom Warkins